















FLORA OF THE USSR

FLORA OF THE USSR

Volume XXII

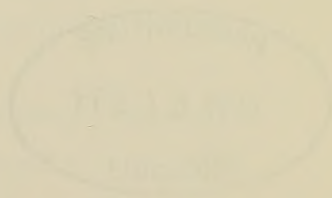
Solanaceae and Scrophulariaceae

E.L. SCHISCHKIN AND K.G. BOBROV

General Manager

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# FLORA OF THE USSR

Initiated under the supervision and chief editorship  
of Academician V.L. Komarov

## VOLUME XXII

### Solanaceae and Scrophulariaceae

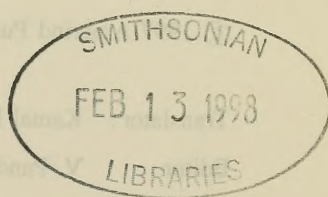
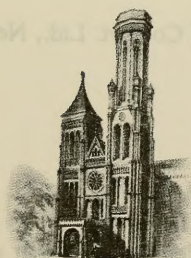
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## SCIENTIFIC EDITOR'S PREFACE TO VOLUME XXII

For practical reasons, I have concentrated my editorial review of this volume on the discussions and the habitat and distribution statements. These are the parts of the text where the specific rendering in English is most critical. Dr. Fet also has reviewed the entire volume and paid particular attention to the geographic and place-name terminology in the distribution statements following the morphological descriptions. We are confident of the general accuracy of the translation but also recognize that there will be imperfections.

June 1996

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## PREFACE

The twenty-second volume contains descriptions of the representatives of the families Solanaceae and Scrophulariaceae. The former includes 45 numbered and 21 unnumbered species, while the latter includes 602 with numbers and only six without.

As in the preceding volumes, in the course of studying the material, nearly ten percent of the species have proved to be new.

Given the large size of this volume, the description, in Latin, of the majority of the new species is given in Vol. XVII of *Botanicheskie materialy Gerbariya Botanicheskogo Instituta Akademii Nauk SSSR* (Botanical Materials of the Herbarium of the Botanical Institute Akad. Nauk USSR), which will be published this year.

The family Solanaceae, with the exception of the genera *Lycopersicon*, *Mandragora*, *Scopolia*, and *Physochlaina*, has been treated by A.I. Pobjarkova.

The large family Scrophulariaceae has been treated by twelve authors. The following genera were found to be the most species-rich: *Verbascum* (B.A. Fedtschenko), *Scrophularia* (S.G. Gorschkova), *Linaria* (L.A. Kuprianova), *Veronica* (A.G. Borissova), *Euphrasia* (S.V. Juzepczuk), and *Pedicularis* (A.I. Vvedensky).

This volume provides brief information on the potato, tomato, pepper, and other economically very important plants of the family Solanaceae.

Some representative of both families are weeds harmful to field and vegetable crops.

Editors



## CONTENTS

	Page No.
SCIENTIFIC EDITOR'S PREFACE TO VOLUME XXII .....	vii
PREFACE .....	ix
SYSTEMATIC INDEX OF SPECIES OF THE TWENTY- SECOND VOLUME OF "FLORA OF THE USSR" .....	xv
CONTRIBUTORS .....	xxxix
 FAMILY CXLI. SOLANACEAE PERS. ....	 1
Tribe 1. Solaneae Schlecht. ....	3
Subtribe 1. Solanineae Dun. ....	3
Genus 1309. <i>Solanum</i> L. ....	3
Subgenus I. <i>Eusolanum</i> Bitter .....	7
Subgenus II. <i>Leptostemonum</i> Dun. ....	33
Genus 1310. <i>Lycopersicon</i> Mill. ....	36
Subgenus I. <i>Eriopersicon</i> C.H. Mull. ....	38
Subgenus II. <i>Eulycopersicon</i> C.H. Mull. ....	40
Subtribe 2. Sarachinae Baehni ....	50
Genus 1311. <i>Capsicum</i> L. ....	50
Subtribe 3. Margaranthinae Baehni ....	53
Genus 1312. <i>Physaliastrum</i> Makino ....	54
Subtribe 4. Physalidinae Baehni ....	55
Genus 1313. <i>Physalis</i> L. ....	55
Tribe 2. Atropeae Rchb. ....	63
Subtribe 1. Atropinae Dun. ....	63
Genus 1314. <i>Atropa</i> L. ....	63
Genus 1315. <i>Mandragora</i> L. ....	67
Genus 1316. <i>Lycium</i> L. ....	69
Subtribe 2. Hyoscyaminae Dun. ....	77
Genus 1317. <i>Hyoscyamus</i> L. ....	77
Genus 1318. <i>Scopolia</i> Jacq. ....	89
Genus 1319. <i>Physochlaina</i> G. Don ....	90

Tribe 3. Nicotianeae G. Don .....	94
Subtribe 1. Nicotianinae Dun. ....	94
Genus 1320. <i>Nicotiana</i> L. ....	94
Tribe 4. Datureae Wettst. ....	97
Subtribe 1. Daturinae G. Don .....	97
Genus 1321. <i>Datura</i> L. ....	97
Tribe 5. Nicandreae Wettst. ....	103
Genus 1322. <i>Nicandra</i> L. ....	103
FAMILY CXLII. SCROPHULARIACEAE LINDL. ....	105
Subfamily 1. Pseudosolanoideae Wettst. ....	109
Tribe 1. Verbasceae Benth. ....	109
Genus 1323. <i>Verbascum</i> L. ....	109
Genus 1324. <i>Celsia</i> L. ....	151
Genus 1325. <i>Staurophragma</i> Fisch. and Mey. ....	154
Subfamily 2. Antirrhinoideae Wettst. ....	156
Tribe 1. Antirrhineae Duby .....	156
Genus 1326. <i>Cymbalaria</i> Medic. ....	156
Genus 1327. <i>Kickxia</i> Dum. ....	157
Genus 1328. <i>Linaria</i> Mill. ....	159
Genus 1329. <i>Antirrhinum</i> L. ....	201
Genus 1330. <i>Chaenorrhinum</i> Lge. ....	202
Tribe 2. Cheloneae Benth. ....	205
Genus 1331. <i>Scrophularia</i> L. ....	205
Genus 1332. <i>Pentastemon</i> L'Herit. ....	274
Tribe 3. Gratiroleae Wettst. ....	275
Genus 1333. <i>Mimulus</i> L. ....	275
Genus 1334. <i>Mazus</i> Lour. ....	280
Genus 1335. <i>Dodartia</i> L. ....	283
Genus 1336. <i>Dopatrium</i> Hamilt. ....	284
Genus 1337. <i>Gratiola</i> L. ....	285
Genus 1338. <i>Limosella</i> L. ....	288
Genus 1339. <i>Vandellia</i> L. ....	290
Genus 1340. <i>Lindernia</i> All. ....	291
Subfamily 3. Rhinanthnoideae Wettst. ....	292
Tribe 1. Veroniceae Benth. ....	292
Genus 1341. <i>Veronica</i> L. ....	293



Subgenus I. <i>Veronicella</i> (Fourr.) Boriss. ....	315
Subgenus II. <i>Paederotella</i> (Wulff) Boriss. ....	433
Subgenus III. <i>Veronicastrum</i> (Heister) Boriss. ....	435
Genus 1342. <i>Lagotis</i> Gaertn. ....	439
Genus 1343. <i>Nathaliella</i> B. Fedtsch. ....	447
Genus 1344. <i>Spirostegia</i> Ivanina ....	450
Genus 1345. <i>Digitalis</i> L. ....	451
Tribe 2. Gerardieae Benth. ....	462
Genus 1346. <i>Leptorhabdos</i> Schrenk. ....	462
Genus 1347. <i>Rhamphicarpa</i> Benth. ....	464
Genus 1348. <i>Castilleja</i> L. F. ....	465
Genus 1349. <i>Melampyrum</i> L. ....	467
Genus 1350. <i>Tozzia</i> L. ....	486
Genus 1351. <i>Phtheirospermum</i> Bge. ....	487
Genus 1352. <i>Euphrasia</i> L. ....	489
Subgenus I. <i>Eu-Eupharasia</i> (Wettst.) ....	498
Genus 1353. <i>Omphalothrix</i> Maxim. ....	558
Genus 1354. <i>Parentucellia</i> Viv. ....	559
Genus 1355. <i>Orthantha</i> (Benth.) Kern. ....	564
Genus 1356. <i>Odontites</i> Zinn. ....	566
Genus 1357. <i>Bartsia</i> L. ....	572
Genus 1358. <i>Bellardia</i> All. ....	573
Genus 1359. <i>Rhinanthus</i> L. ....	574
Genus 1360. <i>Rhynchocorys</i> Griseb. ....	598
Genus 1361. <i>Pedicularis</i> L. ....	600
Genus 1362. <i>Siphonostegia</i> Benth. ....	691
Genus 1363. <i>Bungea</i> C.A.M. ....	693
Genus 1364. <i>Cymbaria</i> L. ....	695
Genus 1365. <i>Cymbochasma</i> (Endl.) Klok. and Zoz. ....	697
Genus 1366. <i>Lathraea</i> L. ....	698
ADDENDA XXI. DIAGNOSES PLANTARUM NOVARUM IN TOMO XXII FLORAE URSS COMMEMORATARUM .....	701
INDEX ALPHABETICUS .....	713



# SYSTEMATIC INDEX OF SPECIES OF THE TWENTY SECOND VOLUME OF 'FLORA OF THE USSR'

	Page No
Family CXLI. Solanaceae Pers. ....	1
Tribe 1. Solaneae Schlecht. ....	3
Subtribe 1. Solanineae Dun. ....	3
Genus 1309. <i>Solanum</i> L. ....	3
Subgenus 1. <i>Eusolanum</i> Bitter ....	7
Section 1. Tuberarium (Dun.) Bitter ....	7
— <i>S. tuberosum</i> L. ....	7
Section 2. Dulcamara (Dun.) Bitter ....	9
12541 1. <i>S. kieseritzkii</i> C.A.M. ....	9
2. <i>S. septemlobum</i> Bge. ....	10
3. <i>S. dulcamara</i> L. ....	11
4. <i>S. litorale</i> Raab. ....	14
5. <i>S. marinum</i> (Bab.) Pojark. ....	14
6. <i>S. depilatum</i> Kitagawa ....	15
7. <i>S. pseudopersicum</i> Pojark. ....	16
8. <i>S. persicum</i> Willd. ....	17
9. <i>S. megacarpum</i> Koidz. ....	18
12550 10. <i>S. asiae-mediae</i> Pojark. ....	19
Section 3. Morella (Dun.) Bitter ....	20
11. <i>S. nigrum</i> L. ....	20
— <i>S. chlorocarpum</i> (Spenn.) Tausch. ....	22
— <i>S. humile</i> Bernh. ....	22
12. <i>S. decipiens</i> Opiz ....	23
13. <i>S. judaicum</i> Bess. ....	24
14. <i>S. transcaasicum</i> Pojark. ....	29
15. <i>S. olgae</i> Pojark. ....	30

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16. <i>S. zelenetzii</i> Pojark. ....	32
— <i>S. alatum</i> Moench .....	33
17. <i>S. woronowii</i> Pojark. ....	34
18. <i>S. pseudoflavum</i> Pojark. ....	35
— <i>S. luteum</i> Mill .....	36
Subgenus II. <i>Leptostemonum</i> Dun.	
Section 1. <i>Melongena</i> Dun.	
— <i>S. melongena</i> L. ....	39
Section 2. <i>Androceras</i> Bitter	
— <i>S. rostratum</i> Dun. ....	41
Genus 1310. <i>Lycopersicon</i> Mill.	
Subgenus I. <i>Eriopersicon</i> C. H. Mull.	
— <i>L. peruvianum</i> (L.) Mill .....	45
Subgenus II. <i>Eulycopersicon</i> C. H. Mull.	
— <i>L. pimpinellifolium</i> (Jusl.) Mill. ....	
— <i>L. humboldtii</i> (Willd.) Dun. ....	49
— <i>L. esculentum</i> Mill .....	50
Subtribe 2. <i>Sarachinae</i> Baehni	
Genus 1311. <i>Capsicum</i> L.	
— <i>C. annuum</i> L. ....	57
Subtribe 3. <i>Margaranthinae</i> Baehni	
Genus 1312. <i>Physaliastrum</i> Makino	
1. <i>P. echinatum</i> (Yatabe) Makino .....	61
Subtribe 4. <i>Physalidinae</i> Baehni	
Genus 1313. <i>Physalis</i> L.	
Section 1. <i>Megista</i> (Fourr.) Rydb.	
12560 1. <i>P. alkekengi</i> L. ....	64
2. <i>P. glabripes</i> Pojark. ....	65
3. <i>P. praetermissa</i> Pojark. ....	67
Section 2. <i>Euphysalis</i> Rydb.	
— <i>P. ixocarpa</i> Brot. ....	68
— <i>P. pubescens</i> L. ....	69
— <i>P. peruviana</i> L. ....	70
Tribe 2. <i>Atropeae</i> Rchb.	

## Subtribe 1. Atropinae Dun.

Genus 1314. *Atropa* L.

- |   |    |
|---|----|
| 1. <i>A. belladonna</i> L. ....             | 72 |
| 2. <i>A. caucasica</i> Kreyer .....         | 73 |
| 3. <i>A. komarovii</i> Blin. and Shal ..... | 74 |

Genus 1315. *Mandragora* L.

- |                                       |    |
|---------------------------------------|----|
| 1. <i>M. turcomanica</i> Mizgir. .... | 75 |
|---------------------------------------|----|

Genus 1316. *Lycium* L.

- |  |    |
|--|----|
| 1. <i>L. turcomanicum</i> Turcz. ....      | 78 |
| 2. <i>L. ruthenicum</i> Murr. ....         | 80 |
| 3. <i>L. flexicaule</i> Pojark. ....       | 81 |
| — <i>L. barbarum</i> L. ....               | 82 |
| 12570 4. <i>L. dasystemum</i> Pojark. .... | 84 |
| 5. <i>L. kopetdaghi</i> Pojark. ....       | 85 |

## Subtribe 2. Hyoscyaminae Dun.

Genus 1317. *Hyoscyamus* L.Section 1. *Euhyoscyamus* Wettst.

- |   |    |
|---|----|
| 1. <i>H. reticulatus</i> L. ....            | 88 |
| 2. <i>H. camerarii</i> Fisch. and Mey. .... | 90 |
| 3. <i>H. kopetdaghi</i> Pojark. ....        | 92 |
| 4. <i>H. turcomanicus</i> Pojark. ....      | 92 |
| 5. <i>H. niger</i> Pojark. ....             | 93 |
| 6. <i>H. bohemicus</i> F. W. Schmidt .....  | 95 |
| 7. <i>H. albus</i> L. ....                  | 96 |
| 8. <i>H. pusillus</i> L. ....               | 98 |

Genus 1318. *Scopolia* Jacq.Section 1. *Euscopolia* Wettst.

- |  |     |
|--|-----|
| 12580 1. <i>S. carniolica</i> Jacq. .... | 100 |
|--|-----|

Genus 1319. *Physochlaina* G. Don.

- |   |     |
|---|-----|
| 1. <i>P. orientalis</i> (M.B.) G. Don. .... | 104 |
| 2. <i>P. physaloides</i> (L.) G. Don. ....  | 104 |
| 3. <i>P. semenowi</i> Rgl. ....             | 105 |

## Tribe 3. Nicotianeae G. Don.

## Subtribe 1. Nicotianinae Dun.

Genus 1320. *Nicotiana* L.

— <i>N. tabacum</i> L. ....	106
— <i>N. rustica</i> L. ....	108
Tribe 4. Datureae Wettst.	
Subtribe 1. Daturinae G. Don.	
Genus 1321. <i>Datura</i> L.	
1. <i>D. stramonium</i> L. ....	109
2. <i>D. tatula</i> L. ....	111
— <i>D. metel</i> L. ....	112
— <i>D. innoxia</i> Mill. ....	114
Tribe 5. Nicandreae Wettst.	
Genus 1322. <i>Nicandra</i> Adans.	
— <i>N. physaloides</i> (L.) Gaertn. ....	116
Family. CXLII. Scrophulariaceae Lindl.	
Subfamily 1. Pseudosolanoideae Wettst.	
Tribe 1. Verbasceae Benth.	
Genus 1323. <i>Verbascum</i> L.	
Section 1. Fasciculata Murb.	
1. <i>V. phlomoides</i> L. ....	123
2. <i>V. georgicum</i> Benth. ....	124
3. <i>V. sessiliflorum</i> Murb. ....	125
4. <i>V. thapsiforme</i> Schrad. ....	126
12590 5. <i>V. thapsus</i> L. ....	128
6. <i>V. glomeratum</i> Boiss. ....	131
7. <i>V. bactrianum</i> Bge. ....	132
8. <i>V. songoricum</i> Schrenk ....	133
9. <i>V. banaticum</i> Roch. ....	134
10. <i>V. speciosum</i> Schrad. ....	135
11. <i>V. megaphlomos</i> (Boiss. and Held.) Hal ....	135
12. <i>V. cheiranthifolium</i> Boiss. ....	136
13. <i>V. pinnatifidum</i> Vahl ....	137
14. <i>V. artvinense</i> Wulff ....	138
12600 15. <i>V. stachydiforme</i> Boiss. and Buhse ....	139
16. <i>V. turkestanicum</i> Franch ....	140
17. <i>V. gnaphalodes</i> M.B. ....	140
18. <i>V. eriorhabdon</i> Boiss. ....	141
19. <i>V. lychnitis</i> L. ....	142

	20. <i>V. turcomanicum</i> Murb. ....	143
	21. <i>V. sinuatum</i> L. ....	144
	22. <i>V. gossypinum</i> M.B. ....	145
	23. <i>V. hajastanicum</i> Bordz. ....	145
	24. <i>V. varians</i> Freyn and Sint. ....	146
12610	25. <i>V. flexuosum</i> Wulff ....	147
	26. <i>V. orientale</i> M.B. ....	147
	27. <i>V. laxum</i> Filar. and Jav ....	148
	28. <i>V. nigrum</i> L. ....	149
	29. <i>V. wilhelmsianum</i> C. Koch ....	150
	30. <i>V. szovitsianum</i> Boiss. ....	151
	31. <i>V. cedreti</i> Boiss. ....	152
	32. <i>V. erivanicum</i> Wulff ....	152
	33. <i>V. paniculatum</i> Wulff ....	153
	34. <i>V. transcausicum</i> Wulff ....	154
12620	35. <i>V. alpigenum</i> C. Koch ....	154
	Section 2. Singuliflora Murb.	
	36. <i>V. ovalifolium</i> Don. ....	156
	37. <i>V. formosum</i> Fisch. ....	157
	38. <i>V. saccatum</i> C. Koch ....	161
	39. <i>V. punalense</i> Boiss. ....	162
	40. <i>V. spectabile</i> M.B. ....	162
	41. <i>V. pyramidatum</i> M.B. ....	162
	42. <i>V. oreophilum</i> C. Koch ....	163
	43. <i>V. macrocarpum</i> Boiss. ....	164
	44. <i>V. blattaria</i> L. ....	167
12630	45. <i>V. phoeniceum</i> L. ....	168
	46. <i>V. flavidum</i> (Boiss.) Freyn and Bornm ....	170
	Genus 1324. <i>Celsia</i> L.	
	1. <i>C. orientalis</i> L. ....	171
	2. <i>C. heterophylla</i> Desf. ....	171
	3. <i>C. nudicaulis</i> (Wydł.) B. Fedtsch. ....	172
	4. <i>C. suworowiana</i> C. Koch ....	173
	Genus 1325. <i>Staurophragma</i> Fisch. and Mey.	
	1. <i>S. natolicum</i> Fisch. and Mey. ....	174
	Subfamily 2. Antirrhinoideae Wettst.	



## Tribe 1. Antirrhineae Duby

Genus 1326. *Cymbalaria* Medic.

1. *C. muralis* G.M. Sch. .... 175

Genus 1327. *Kickxia* Dum.

1. *K. spuria* (L.) Dum. .... 176

2. *K. elatine* (L.) Dum. .... 177

- 12640 3. *K. caucasica* (Mussin) Kuprian. .... 178

Genus 1328. *Linaria* Mill.Section 1. *Speciosae* (Benth.) Wettst.

1. *L. grandiflora* Desf. .... 187

2. *L. zangezura* Grossh. .... 188

3. *L. genistifolia* (L.) Mill. .... 188

4. *L. pontica* Kuprian. .... 189

5. *L. sabulosa* Czern. .... 190

6. *L. euxina* Velen. .... 190

7. *L. syspirensis* C. Koch .... 193

Section 2. *Grandes* (Benth.) Wettst.

8. *L. lenkoranica* Kuprian. .... 194

9. *L. kopetdaghensis* Kuprian. .... 194

- 12650 10. *L. kurdica* Boiss. and Hoh. .... 195

11. *L. lineolata* Boiss. .... 195

12. *L. buriatica* Turcz. .... 197

13. *L. biebersteinii* Bess. .... 197

14. *L. ruthenica* Blonski .... 197

15. *L. schelkovnikovii* Schischk. .... 198

16. *L. vulgaris* Mill. .... 201

17. *L. acutiloba* Fisch. .... 202

18. *L. melampyroides* Kuprian. .... 202

19. *L. popovii* Kuprian. .... 203

- 12660 20. *L. sessilis* Kuprian. .... 204

21. *L. kokanica* Rgl. .... 204

22. *L. kulabensis* B. Fedtsch. .... 205

23. *L. hepatica* Bge. .... 205

24. *L. bungei* Kuprian. .... 206

25. *L. transiliensis* Kuprian. .... 206

26. *L. ramosa* (Kar. and Kir.) Kuprian. .... 207



	27. <i>L. altaica</i> Fisch. ....	207
	28. <i>L. dolichocarpa</i> Klok .....	208
	29. <i>L. odora</i> (M.B.) Fisch. ....	208
12670	30. <i>L. dulcis</i> Klok. ....	209
	31. <i>L. loeselii</i> Schweig. ....	209
	32. <i>L. brachyceras</i> (Bge.) Kuprian. ....	210
	33. <i>L. dolichoceras</i> Kuprian. ....	210
	34. <i>L. leptoceras</i> Kuprian. ....	211
	35. <i>L. pedicellata</i> Kuprian. ....	211
	36. <i>L. striatella</i> Kuprian. ....	211
	37. <i>L. meyeri</i> Kuprian. ....	212
	38. <i>L. debilis</i> Kuprian. ....	215
	39. <i>L. incompleta</i> Kuprian. ....	215
12680	40. <i>L. macrourea</i> M.B. Chav. ....	216
	41. <i>L. schirvanica</i> Fom. ....	216
	42. <i>L. elymaitica</i> (Boiss.) Kuprian. ....	217
	Section 3. Versicolores (Benth.) Wettst.	
	43. <i>L. chalepensis</i> (L.) Mill. ....	217
	44. <i>L. armeniaca</i> Chav. ....	218
	45. <i>L. canadensis</i> (L.) Dum. ....	218
	46. <i>L. bipartita</i> (Vent.) Willd. ....	218
	47. <i>L. corifolia</i> Desf. ....	219
	48. <i>L. monspessulana</i> (L.) Mill. ....	219
	Section 4. Diffusae Benth.	
	49. <i>L. reflexa</i> (L.) Desf. ....	220
12690	50. <i>L. japonica</i> Miq. ....	220
	51. <i>L. cretacea</i> Fisch. ....	221
	52. <i>L. cretica</i> Kuprian. ....	221
	53. <i>L. macrophylla</i> Kuprian. ....	222
	Section 5. Arvenses (Benth.) Wettst.	
	54. <i>L. arvensis</i> (L.) Desf. ....	222
	55. <i>L. turcomanica</i> Kuprian. ....	223
	56. <i>L. simplex</i> (Willd.) DC. ....	223
	57. <i>L. micrantha</i> (Cav.) Hoffmg. ....	224
	58. <i>L. pelisseriana</i> (L.) DC. ....	224
	Section 6. Minutiflorae Benth.	

	59. <i>L. albifrons</i> (Sibth. and Sm.) Spreng. ....	225
	Genus 1329. <i>Antirrhinum</i> L.	
12700	1. <i>A. orontium</i> L. ....	226
	2. <i>A. majus</i> L. ....	226
	Genus 1330. <i>Chaenorrhinum</i> Lge.	
	1. <i>C. viscidum</i> (Moench) Simk. ....	227
	2. <i>C. klokovii</i> Kotov ....	228
	3. <i>C. spicatum</i> Korov ....	228
	4. <i>C. rytidosperrum</i> (Fisch. and Mey. Kuprian. ....	228
	Tribe 2. <i>Cheloneae</i> Benth.	
	Genus 1331. <i>Scrophularia</i> L.	
	Section 1. <i>Anastomosanthus</i> Stiefelhag	
	1. <i>S. verticillata</i> Gontsch. and Grig. ....	246
	2. <i>S. lateriflora</i> Trautv. ....	246
	3. <i>S. nikitinii</i> Gorschk. ....	247
	4. <i>S. tadshicorum</i> Gontsch. ....	247
12710	5. <i>S. kotschyana</i> Benth. ....	248
	6. <i>S. chrysantha</i> Jaub. and Spach ....	249
	7. <i>S. lunariifolia</i> Boiss. and Bal. ....	250
	8. <i>S. hyrcana</i> Grossh. ....	250
	9. <i>S. vernalis</i> L. ....	251
	Section 2. <i>Scorodonia</i> G. Don.	
	10. <i>S. amplexicaulis</i> Benth. ....	252
	11. <i>S. ilvensis</i> C. Koch ....	255
	12. <i>S. divaricata</i> Ldb. ....	256
	13. <i>S. sprengeriana</i> Somm. and Lev. ....	257
	14. <i>S. mollis</i> Somm. and Lev. ....	257
12720	15. <i>S. peregrina</i> L. ....	258
	16. <i>S. chlorantha</i> Kotschy ....	258
	17. <i>S. scopolii</i> Hoppe ....	259
	18. <i>S. heucheriaeflora</i> Schrenk ....	260
	19. <i>S. altaica</i> Murr. ....	261
	20. <i>S. mandshurica</i> Maxim ....	262
	21. <i>S. maximowiczii</i> Gorschk. ....	262
	22. <i>S. amgunensis</i> F. Schmidt ....	265
	23. <i>S. macrobotrys</i> Ldb. ....	266

	24. <i>S. nodosa</i> L. ....	269
12730	25. <i>S. oldhami</i> Oliver .....	270
	26. <i>S. alata</i> Gilib. ....	270
	27. <i>S. grayana</i> Maxim. ....	271
	28. <i>S. czernjakowskiana</i> B. Fedtsch. ....	272
	Section 3. <i>Tomioophyllum</i> (Benth.) Gorschk	
	29. <i>S. orientalis</i> L. ....	273
	30. <i>S. nervosa</i> Benth. ....	274
	31. <i>S. minima</i> M.B. ....	275
	32. <i>S. sareptana</i> Kleopov .....	276
	33. <i>S. donetzica</i> Kotov .....	276
	34. <i>S. rupestris</i> M.B. ....	277
12740	35. <i>S. goldeana</i> Juz. ....	278
	36. <i>S. charadzei</i> Kem.-Nath. ....	278
	37. <i>S. imeretica</i> Kem.-Nath. ....	279
	38. <i>S. atropatana</i> Grossh. ....	279
	39. <i>S. nachitschevanica</i> Grossh. ....	280
	40. <i>S. litwinovii</i> B. Fedtsch. ....	281
	41. <i>S. frigida</i> Boiss. ....	281
	42. <i>S. integrifolia</i> Pavl. ....	282
	43. <i>S. rutifolia</i> Boiss. ....	285
	44. <i>S. olgae</i> Grossh. ....	286
12750	45. <i>S. armeniaca</i> Bordz. ....	286
	46. <i>S. rostrata</i> Boiss. ....	287
	47. <i>S. ruprechtii</i> Boiss. ....	288
	48. <i>S. olympica</i> Boiss. ....	288
	49. <i>S. exilis</i> Popl. ....	289
	50. <i>S. grossheimii</i> B. Schischk. ....	290
	51. <i>S. xanthoglossa</i> Boiss. ....	291
	52. <i>S. striata</i> Boiss. ....	291
	53. <i>S. decipiens</i> Boiss. and Kotschy .....	292
	54. <i>S. fedtschenkoi</i> Gorschk. ....	293
12760	55. <i>S. zaravschanica</i> Gorschk. ....	293
	56. <i>S. pamiro-alaica</i> Gorschk. ....	294
	57. <i>S. gontscharovii</i> Gorschk. ....	295
	58. <i>S. multicaulis</i> Turcz. ....	295

	59. <i>S. haematantha</i> Boiss. and Heldr. ....	296
	60. <i>S. leuoclada</i> Bge. ....	297
	61. <i>S. cretacea</i> Fisch. ....	297
	62. <i>S. canescens</i> Bong. ....	298
	63. <i>S. zuvandica</i> Grossh. ....	299
	64. <i>S. pruinosa</i> Boiss. ....	300
12770	65. <i>S. dissecta</i> (B. Fedtsch.) Gorschk. ....	300
	66. <i>S. canina</i> L. ....	301
	67. <i>S. variegata</i> M.B. ....	302
	68. <i>S. thesioides</i> Boiss. and Buhse ....	303
	69. <i>S. turcomanica</i> Bornm. ....	304
	70. <i>S. czpandaghii</i> B. Fedtsch. ....	304
	71. <i>S. kabadianensis</i> B. Fedtsch. ....	305
	72. <i>S. sangtodenensis</i> B. Fedtsch. ....	306
	73. <i>S. kiriloviana</i> Schischk. ....	306
	74. <i>S. incisa</i> Weinm. ....	307
	Genus 1332. <i>Pentastemon</i> L'Hérit	
12780	1. <i>P. frutescens</i> Lamb. ....	309
	Tribe 3. Cratioleae Wettst.	
	Genus 1333. <i>Mimulus</i>	
	Section 1. <i>Eumimulus</i> Gray	
	1. <i>M. ringens</i> L. ....	312
	Section 2. <i>Simiolus</i> Greene	
	2. <i>M. guttatus</i> DC. ....	312
	3. <i>M. pilosiusculus</i> H.B.K. ....	313
	Section 3. <i>Paradanthus</i> Grant.	
	4. <i>M. tenellus</i> Bge. ....	314
	5. <i>M. stolonifer</i> Novopokr. ....	314
	6. <i>M. moschatus</i> Dougl.-Lindl. ....	315
	Genus 1334. <i>Mazus</i> Lour.	
	1. <i>M. japonicus</i> (Thnb.) O. Ktze. ....	316
	2. <i>M. stachydifolius</i> (Turcz.) Maxim. ....	317
	Genus 1335. <i>Dodartia</i> L.	
	1. <i>D. orientalis</i> L. ....	319
	Genus 1336. <i>Dopatrium</i> Hamilt.	

12790	1. <i>D. junceum</i> (Roxb.) Hamilt. ....	320
	Genus 1337. <i>Gratiola</i> L.	
	1. <i>G. officinalis</i> L. ....	322
	2. <i>G. japonica</i> Miq. ....	323
	Genus 1338. <i>Limosella</i> L.	
	1. <i>L. aquatica</i> L. ....	324
	Genus 1339. <i>Vandelia</i> L.	
	1. <i>V. diffusa</i> L. ....	326
	Genus 1340. <i>Lindernia</i> All.	
	1. <i>L. pyxidaria</i> All. ....	328
	Subfamily 3. Rhinanthoideae Wettst.	
	Tribe 1. Veroniceae Benth.	
	Genus 1341. <i>Veronica</i> L.	
	Subgenus I. <i>Veronicella</i> (Fourr.) Boriss.	
	Section 1. Euveronica Griseb.	
	1. <i>V. gentianoides</i> Vahl. ....	356
	2. <i>V. imeretica</i> Kem.-Nath. ....	358
	3. <i>V. kemulariae</i> Kuthath. ....	358
	4. <i>V. charadzeae</i> Kem.-Nath. ....	361
12800	5. <i>V. schistosa</i> E. Busch. ....	362
	6. <i>V. monticola</i> Trautv. ....	362
	7. <i>V. stelleri</i> Pall. ....	363
	8. <i>V. schmidtiana</i> Rgl. ....	364
	9. <i>V. serpyllifolia</i> L. ....	365
	10. <i>V. humifusa</i> Dickson ....	366
	11. <i>V. riederiana</i> Gandoger ....	367
	Section 2. Pseudolysimachia C. Koch	
	12. <i>V. longifolia</i> L. ....	367
	13. <i>V. septentrionalis</i> Boriss. ....	369
	14. <i>V. bachofenii</i> Heuff. ....	369
12810	15. <i>V. olgensis</i> Kom. ....	370
	16. <i>V. subsessilis</i> (Miq.) Carrière ....	371
	17. <i>V. dahurica</i> Stev. ....	372
	18. <i>V. sajanensis</i> Printz ....	375
	19. <i>V. spuria</i> L. ....	376

	20. <i>V. komarovii</i> Monjuschko .....	377
	21. <i>V. incana</i> L. ....	377
	22. <i>V. bellidifolia</i> Juz. ....	379
	23. <i>V. hololeuca</i> Juz. ....	380
	24. <i>V. spicata</i> L. ....	381
12820	25. <i>V. porphyriana</i> Pavl. ....	382
	26. <i>V. barrelieri</i> Schult. ....	383
	27. <i>V. orchidea</i> Crantz .....	384
	28. <i>V. alata</i> M. Pop. ....	385
	29. <i>V. liniifolia</i> Pall. ....	386
	30. <i>V. laeta</i> Kar. and Kir .....	389
	31. <i>V. arenosa</i> (Serg.) Boriss. ....	390
	32. <i>V. sessiliflora</i> Bge. ....	391
	33. <i>V. pinnata</i> L. ....	391
	Section 3. <i>Omphalospora</i> Bess.	
	34. <i>V. biloba</i> L. ....	392
12830	35. <i>V. chantavica</i> Pavl. ....	393
	36. <i>V. argute-serrata</i> Rgl. and Schmalh. ....	394
	37. <i>V. bornmülleri</i> Hausskn. ....	395
	38. <i>V. karata</i> M. Pop. ....	395
	39. <i>V. Nevskii</i> Boriss. ....	396
	40. <i>V. rubrifolia</i> Boiss. ....	396
	41. <i>V. albanica</i> C. Koch .....	397
	42. <i>V. campylopoda</i> Boiss. ....	397
	43. <i>V. ramosissima</i> Boriss. ....	398
	44. <i>V. bucharica</i> B. Fedtsch. ....	399
12840	45. <i>V. capillipes</i> Nevski .....	400
	46. <i>V. stylophora</i> M. Pop. ....	400
	47. <i>V. tenuissima</i> Boriss. ....	403
	48. <i>V. intercedens</i> Bornm. ....	404
	49. <i>V. cardiocarpa</i> (Kar. and Kir.) Walpers .....	404
	50. <i>V. triphyllos</i> L. ....	405
	51. <i>V. praecox</i> All. ....	406
	52. <i>V. amoena</i> Stev. ....	407
	53. <i>V. agrestis</i> L. ....	408
	54. <i>V. didyma</i> Ten. ....	409



12850	55. <i>V. opaca</i> Fries .....	410
	56. <i>V. persica</i> Poir. ....	411
	Section 4. <i>Diplophyllum</i> (Lehm.) Boriss	
	57. <i>V. crista-galli</i> Stev. ....	413
	Section 5. <i>Megasperma</i> (Lehm.) Boriss	
	58. <i>V. hederifolia</i> L. ....	414
	59. <i>V. cymbalaria</i> Bod. ....	417
	Section 6. <i>Alsinebe</i> Griseb.	
	60. <i>V. arvensis</i> L. ....	418
	61. <i>V. peregrina</i> L. ....	420
	62. <i>V. dillenii</i> Crantz ....	420
	63. <i>V. verna</i> L. ....	421
	64. <i>V. turkmenorum</i> B. Fedtsch. ....	422
12860	65. <i>V. filiformis</i> Smith ....	423
	66. <i>V. ceratocarpa</i> C.A.M. ....	424
	67. <i>V. perpusilla</i> Boiss. ....	425
	68. <i>V. minima</i> C. Koch ....	426
	69. <i>V. acinifolia</i> L. ....	429
	Section 7. <i>Chamaedrys</i> Griseb.	
	70. <i>V. chamaedrys</i> L. ....	430
	71. <i>V. melissifolia</i> Desf. ....	432
	72. <i>V. umbrosa</i> M.B. ....	432
	73. <i>V. nigricans</i> C. Koch ....	433
	74. <i>V. teucrium</i> L. ....	434
12870	75. <i>V. dentata</i> Schmidt ....	435
	76. <i>V. krylovii</i> Schischk. ....	436
	77. <i>V. prostrata</i> L. ....	437
	78. <i>V. austriaca</i> L. ....	438
	79. <i>V. arceutobia</i> Woron. ....	439
	80. <i>V. caucasica</i> M.B. ....	439
	81. <i>V. orientalis</i> Mill. ....	440
	82. <i>V. taurica</i> Willd. ....	443
	83. <i>V. kurdica</i> Benth. ....	443
	84. <i>V. denudata</i> Alboff ....	444
12880	85. <i>V. multifida</i> L. ....	444
	86. <i>V. filifolia</i> Lipsky ....	445

	87. <i>V. czerniakowskiana</i> Monjuschko .....	446
	88. <i>V. tripartita</i> Boriss. ....	447
	89. <i>V. khorossanica</i> Czernjak. ....	448
	90. <i>V. officinalis</i> L. ....	449
	91. <i>V. galathica</i> Boiss. ....	450
	92. <i>V. aphylla</i> L. ....	451
	93. <i>V. baumgartenii</i> Roem. and Schult. ....	451
	94. <i>V. grandiflora</i> Gaertn. ....	452
12890	95. <i>V. scutellata</i> L. ....	453
	96. <i>V. callitrichoides</i> Kom. ....	454
	97. <i>V. montana</i> L. ....	455
	98. <i>V. maxima</i> Mill. ....	456
	99. <i>V. minuta</i> C.A.M. ....	459
	100. <i>V. kopetdaghensis</i> B. Fedtsch. ....	460
	101. <i>V. telephiiifolia</i> Vahl ....	461
	102. <i>V. glabrifolia</i> Boriss. ....	461
	103. <i>V. peduncularis</i> M.B. ....	462
	104. <i>V. petraea</i> (M.B.) Stev. ....	464
12900	105. <i>V. propingua</i> Boriss. ....	464
	106. <i>V. baranetzkiï</i> Bordz. ....	465
	107. <i>V. oltensis</i> Woron. ....	466
	108. <i>V. microcarpa</i> Boiss. ....	467
	109. <i>V. armena</i> Boiss. ....	467
	Section 8. <i>Beccabunga</i> Griseb.	
	110. <i>V. anagallis-aquatica</i> L. ....	469
	111. <i>V. anagalloides</i> Guss. ....	470
	112. <i>V. anagallidiformis</i> Boreau ....	473
	113. <i>V. scardica</i> Griseb. ....	474
	114. <i>V. poljensis</i> Murbeck ....	475
12910	115. <i>V. beccabunga</i> L. ....	475
	116. <i>V. americana</i> (Rafin.) Schweinitz ....	477
	117. <i>V. beccabungoides</i> Bornm. ....	478
	118. <i>V. montioides</i> Boiss. ....	478
	119. <i>V. bobrovii</i> Nevski ....	479
	120. <i>V. michauxii</i> Lam. ....	479
	121. <i>V. lysimachioides</i> Boiss. ....	480



	122. <i>V. oxycarpa</i> Boiss. ....	480
	Section 9. <i>Macrostemon</i> Boriss	
	123. <i>V. alpina</i> L. ....	481
	124. <i>V. bellidioides</i> L. ....	482
12920	125. <i>V. fruticosus</i> L. ....	483
	126. <i>V. fruticans</i> Jacq. ....	484
	127. <i>V. lütkeana</i> Rupr. ....	485
	128. <i>V. macrostemon</i> Bge. ....	485
	129. <i>V. densiflora</i> Ldb. ....	486
	130. <i>V. macrostemonoides</i> Zak. ....	487
	131. <i>V. serpylloides</i> Rgl. ....	488
	Section 10. <i>Stenocarpum</i> Boriss	
	132. <i>V. tianschanica</i> Lincz. ....	488
	133. <i>V. gorbunovii</i> Gontsch. ....	489
	134. <i>V. ciliata</i> Fisch. ....	490
12930	135. <i>V. fedtschenkoi</i> Boriss. ....	491
	Subgenus II. <i>Paederotella</i> (Wulff) Boriss.	
	136. <i>V. ruprechtii</i> Lipsky ....	492
	137. <i>V. teberdensis</i> (Kem.-Nath.) Boriss. ....	493
	138. <i>V. daghestanica</i> Trautv. ....	493
	Subgenus III. <i>Veronicastrum</i> (Heister) Boriss.	
	139. <i>V. tubiflora</i> Fisch. and Mey. ....	494
	140. <i>V. sibirica</i> L. ....	495
	141. <i>V. sachalinensis</i> Boriss. ....	496
	142. <i>V. cerasifolia</i> Monjuschko ....	499
	Genus 1342. <i>Lagotis</i> Gaertn.	
	Section 1. <i>Caulescentes</i> Maxim	
	1. <i>L. integrifolia</i> (Willd.) Schischk. ....	502
	2. <i>L. uralensis</i> Schischk. ....	503
12940	3. <i>L. glauca</i> Gaertn. ....	504
	4. <i>L. minor</i> (Willd.) Standl. ....	505
	5. <i>L. decumbens</i> Rupr. ....	506
	6. <i>L. ikonnikovii</i> Schischk. ....	509
	Section 2. <i>Acaules</i> Maxim	
	7. <i>L. korolkowii</i> (Rgl. and Schmalh.) Maxim ....	509

	8. <i>L. stolonifera</i> (C. Koch) Maxim. ....	510
	Genus 1343. <i>Nathalliella</i> B. Fedtsch.	
	1. <i>N. alaica</i> B. Fedtsch. ....	511
	Genus 1344. <i>Spirostegia</i> Ivanina	
	1. <i>S. bucharica</i> (B. Fedtsch.) Ivanina ....	513
	Genus 1345. <i>Digitalis</i> L.	
	Section 1. <i>Grandiflorae</i> Benth	
	— <i>D. purpurea</i> L. ....	518
	1. <i>D. grandiflora</i> Mill. ....	520
	2. <i>D. ciliata</i> Trautv. ....	521
	Section 2. <i>Globiflorae</i> Benth	
12950	3. <i>D. ferruginea</i> L. ....	522
	4. <i>D. schischkinii</i> Ivan. ....	523
	5. <i>D. nervosa</i> Steud. and Hochst. ....	524
	6. <i>D. lanata</i> Ehrh. ....	525
	Tribe 2. <i>Gerardieae</i> Benth.	
	Genus 1346. <i>Leptorhabdos</i> Schrenk.	
	1. <i>L. parviglora</i> Benth. ....	527
	Genus 1347. <i>Rhamphicarpa</i> Benth.	
	1. <i>R. medwedewii</i> Alb. ....	529
	Tribe 3. <i>Euphrasieae</i> Benth.	
	Genus L. 1348. <i>Castilleja</i>	
	1. <i>C. pallida</i> (L.) Kunth ....	531
	2. <i>C. arctica</i> Kryl. and Serg. ....	532
	Genus 1349. <i>Melampyrum</i> L.	
	Section 1. <i>Spicata</i> (Wettst.) Soo	
	1. <i>M. cristatum</i> L. ....	536
	2. <i>M. chlorostachyum</i> Beauv. ....	537
12960	3. <i>M. caucasicum</i> Bge. ....	538
	4. <i>M. alboffianum</i> Beauv. ....	539
	5. <i>M. arvense</i> L. ....	540
	6. <i>M. argyrocomum</i> Fisch. ....	541
	7. <i>M. elatius</i> Reuter ....	542
	Section 2. <i>Laxiflora</i> (Wettst.) Soo	

	8. <i>M. nemorosum</i> L. ....	543
	9. <i>M. polonicum</i> (Beuav.) Soo .....	545
	10. <i>M. roseum</i> Maxim. ....	545
	11. <i>M. setaceum</i> (Maxim.) Nakai .....	546
	12. <i>M. silvaticum</i> L. ....	549
12970	13. <i>M. herbichii</i> Woloszczak .....	550
	14. <i>M. saxosum</i> Baumg. ....	551
	15. <i>M. pratense</i> L. ....	552
	16. <i>M. laciniatum</i> Koshewn. and Zing. ....	553
	Genus 1350. <i>Tozzia</i> L.	
	1. <i>T. carpathica</i> Woloszcz. ....	554
	Genus 1351. <i>Phtheirospermum</i> Bge.	
	1. <i>Ph. chinense</i> Bge. ....	555
	Genus 1352. <i>Euphrasia</i> L.	
	Subgenus 1. <i>Eu-Euphrasia</i> (Wettst.)	
	Section 1. <i>Semicalcaratae</i> Benth	
	1. <i>E. maximowiczii</i> Wettst. ....	568
	2. <i>E. ussuriensis</i> Juz. ....	569
	3. <i>E. tatarica</i> Fisch. ....	570
	4. <i>E. sibirica</i> Serg. ....	574
12980	5. <i>E. syreitschikovi</i> Govor. ....	574
	6. <i>E. Irenae</i> Juz. ....	575
	7. <i>E. macrocalyx</i> Juz. ....	576
	8. <i>E. pectinata</i> Ten. ....	577
	9. <i>E. georgica</i> Kem.-Nath. ....	577
	10. <i>E. townsendiana</i> Freyn. ....	578
	11. <i>E. jacutica</i> Juz. ....	579
	12. <i>E. condensata</i> Jord. ....	579
	13. <i>E. reuteri</i> Wettst. ....	581
	14. <i>E. brevipila</i> Burn. and Cremli .....	582
	— <i>E. murbeckii</i> Wettst. ....	586
12990	15. <i>E. tenuis</i> (Brenn.) Wettst. ....	587
	16. <i>E. caucasica</i> Juz. ....	587
	17. <i>E. svanica</i> Kem.-Nath. ....	588
	18. <i>E. regelii</i> Wettst. ....	589
	19. <i>E. fedtschenkoana</i> Wettst. ....	590

	20. <i>E. hyperborea</i> Jörgens .....	591
	21. <i>E. saamica</i> Juz. ....	592
	22. <i>E. subpolaris</i> Juz. ....	593
	23. <i>E. bajankolica</i> Juz. ....	594
	24. <i>E. cyclophylla</i> Juz. ....	595
13000	25. <i>E. tranzszelli</i> Juz. ....	596
	26. <i>E. krassnowii</i> Juz. ....	599
	27. <i>E. parviflora</i> Schagerström .....	600
	28. <i>E. uechtritzi</i> Jung. and Engl. ....	601
	29. <i>E. glabrescens</i> (Wettst.) Wiinst. ....	602
	30. <i>E. micrantha</i> Rchb. ....	603
	31. <i>E. frigida</i> Pugsl. ....	608
	32. <i>E. tatre</i> Wettst. ....	606
	33. <i>E. grossheimii</i> Kem.-Nath. ....	607
	34. <i>E. drosophylla</i> Juz. ....	608
13010	35. <i>E. altaica</i> Serg. ....	611
	36. <i>E. mollis</i> Ldb. ....	611
	37. <i>E. pseudomollis</i> Juz. ....	612
	38. <i>E. amblyodonta</i> Juz. ....	613
	39. <i>E. juzepczukii</i> Denissova .....	614
	40. <i>E. kernerii</i> Wettst. ....	615
	41. <i>E. picta</i> Wimm. ....	616
	42. <i>E. peduncularis</i> Juz. ....	617
	43. <i>E. schugnanica</i> Juz. ....	618
	44. <i>E. albofi</i> Chab. ....	619
13020	45. <i>E. macrodonta</i> Juz. ....	619
	46. <i>E. kemulariae</i> Juz. ....	620
	47. <i>E. petiolaris</i> Wettst. ....	621
	48. <i>E. adenocaulon</i> Juz. ....	623
	49. <i>E. ossica</i> Juz. ....	624
	50. <i>E. sevanensis</i> Juz. ....	625
	51. <i>E. daghestanica</i> Juz. ....	625
	52. <i>E. woronowii</i> Juz. ....	626
	53. <i>E. taurica</i> Ganesch. ....	627
	54. <i>E. amurensis</i> Freyn .....	628
13030	55. <i>E. rostkoviana</i> Hayne .....	632
	56. <i>E. montana</i> Jord .....	633

57. <i>E. fennica</i> Kihlm. ....	634
58. <i>E. onegensis</i> Cajand. ....	635
59. <i>E. hirtella</i> Jord. ....	635
60. <i>E. sosnowskyi</i> Kem.-Nath. ....	637
61. <i>E. bakurianica</i> Juz. ....	638
62. <i>E. salisburgensis</i> Funk ....	638

Genus 1353. *Omphalothrix* Maxim.

1. <i>O. longipes</i> Maxim ....	640
----------------------------------	-----

Genus 1354. *Parentucellia* Viv.

1. <i>P. latifolia</i> (L.) Caruel. ....	642
13040 2. <i>P. flaviflora</i> (Boiss.) Nevski ....	645
3. <i>P. viscosa</i> (L.) Caruel. ....	646

Genus 1355. *Orphantha* (Benth.) Kern.

1. <i>O. lutea</i> (L.) Kern ....	647
2. <i>O. aucheri</i> (Boiss.) Wettst. ....	648

Genus 1356. *Odontites* Zinn

1. <i>O. serotina</i> (Lam.) Dum. ....	650
2. <i>O. salina</i> Kotov ....	652
3. <i>O. verna</i> (Bell.) Dum. ....	652
4. <i>O. litoralis</i> Fries ....	655
5. <i>O. glutinosa</i> (M.B.) Benth. ....	656

Genus 1357. *Bartsia* L.

1. <i>B. alpina</i> L. ....	657
-----------------------------	-----

Genus 1358. *Bellardia* All.

13050 1. <i>B. trixago</i> (L.) All. ....	659
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Genus 1359. *Rhinanthus* L.

Section 1. *Glabri* (Soo) Vass.

1. <i>R. montanus</i> Saut. ....	664
2. <i>R. aestivalis</i> (Zing.) Schischk. ....	665
3. <i>R. cretaceus</i> Vass. ....	666
4. <i>R. vernalis</i> (Zing.) Schischk. ....	666
5. <i>R. ponticus</i> (Stern.) Vass. ....	667
6. <i>R. pectinatus</i> (Behrend.) Vass. ....	668
7. <i>R. subulatus</i> (Stern.) Soo ....	668
8. <i>R. songaricus</i> (Stern.) B. Fedtsch. ....	671

	9. <i>R. ferganensis</i> Vass. ....	672
13060	10. <i>R. apterus</i> (Fries) Ostenf. ....	673
	11. <i>R. sachalinensis</i> Vass. ....	674
	Section 2. <i>Minores</i> Stern.	
	12. <i>R. nigricans</i> Meinsh. ....	675
	13. <i>R. angustifolius</i> Gmel. ....	675
	14. <i>R. minor</i> L. ....	676
	15. <i>R. rusticulus</i> (Chab.) Druce ....	677
	16. <i>R. groenlandicus</i> (Ostenf.) Chab. ....	678
	17. <i>R. alpinus</i> Baumg. ....	679
	18. <i>R. borealis</i> (Stern.) Oruce ....	679
	Section 3. <i>Hirsuti</i> (Soó) Vass.	
	19. <i>R. major</i> L. ....	680
13070	20. <i>R. patulus</i> (Stern.) Thell. and Schinz ....	680
	21. <i>R. colchicus</i> Vass. ....	681
	22. <i>R. mediterraneus</i> (Stern.) Adamovic ....	682
	Section 4. <i>Schischkiniella</i> Vass.	
	23. <i>R. schischkini</i> Vass. ....	683
	24. <i>R. rumelicus</i> Velen. ....	683
	25. <i>R. ösile</i> nsis (Ronn. and Saars.) Vass. ....	684
	X <i>R. fallax</i> (Wimm. and Grab.) Chal. ....	684
	X <i>R. pseudosongoricus</i> Vass. ....	685
	X <i>R. pseudomontanus</i> V. Krecz. ....	685
	X <i>R. hungaricus</i> (Borb.) Soó ....	
	Genus 1360. <i>Rhynchocorys</i> Griseb.	
	1. <i>R. orientalis</i> (L.) Benth. ....	685
	2. <i>R. elephas</i> (L.) Griseb. ....	
	Genus 1361. <i>Pedicularis</i> L.	
	Section 1. <i>Siphonantha</i> Bge.	
	1. <i>P. longiflora</i> Rudolph ....	699
	2. <i>P. rhinanthoides</i> Schrenk ....	700
13080	3. <i>P. peduncularis</i> M. Pop. ....	700
	Section 2. <i>Cyclophyllum</i> Bge.	
	4. <i>P. tianschanica</i> Rupr. ....	703
	5. <i>P. chamissonis</i> Stev. ....	704



	6. <i>P. crassirostris</i> Bge. ....	705
	7. <i>P. macrochila</i> Vved. ....	705
	8. <i>P. arguteserrata</i> Vved. ....	706
	9. <i>P. korolkovii</i> Rgl. ....	707
	10. <i>P. eriophora</i> Turcz. ....	708
	11. <i>P. amoena</i> Adams ....	709
	12. <i>P. violascens</i> Schrenk ....	709
13090	13. <i>P. subrostrata</i> C.A.M. ....	711
	14. <i>P. pontica</i> Boiss. ....	712
	15. <i>P. caucasica</i> M.B. ....	712
	16. <i>P. cheilanthifolia</i> Schrenk ....	713
	17. <i>P. verticillata</i> L. ....	714
	18. <i>P. interrupta</i> Steph. ....	715
	19. <i>P. platyrrhycha</i> Schrenk ....	716
	20. <i>P. pycnantha</i> Boiss. ....	719
	21. <i>P. olgae</i> Rgl. ....	720
	22. <i>P. amoeniflora</i> Vved. ....	721
13100	23. <i>P. pulchra</i> Pauls ....	722
	24. <i>P. veræ</i> Vved. ....	723
	25. <i>P. zeravschanica</i> Rgl. ....	723
	26. <i>P. inconspicua</i> Vved. ....	724
	27. <i>P. semenovii</i> Rgl. ....	725
	28. <i>P. popovii</i> Vved. ....	726
	29. <i>P. karatavica</i> Pavl. ....	727
	30. <i>P. waldheimii</i> Bonati ....	727
	31. <i>P. maximowiczii</i> Krassn. ....	728
	32. <i>P. myriophylla</i> Pall. ....	729
13110	33. <i>P. ludwigii</i> Rgl. ....	729
	34. <i>P. abrotanifolia</i> M.B. ....	730
	35. <i>P. spicata</i> Pall. ....	731
	Section 3. Rhyncholopha Bge.	
	36. <i>P. kuznetzovii</i> Kom. ....	732
	37. <i>P. lapponica</i> L. ....	732
	38. <i>P. tristis</i> L. ....	736
	39. <i>P. yezoënsis</i> Maxim. ....	737
	40. <i>P. resupinata</i> L. ....	737

	41. <i>P. labradorica</i> Wirsing. ....	738
	42. <i>P. sudetica</i> Willd. ....	739
13120	43. <i>P. villosa</i> Ldb. ....	740
	44. <i>P. nasuta</i> M.B. ....	741
	45. <i>P. uliginosa</i> Bge. ....	742
	46. <i>P. striata</i> Pall. ....	743
	47. <i>P. elata</i> Willd. ....	744
	48. <i>P. nordmanniana</i> Bge. ....	745
	49. <i>P. proboscidea</i> Stev. ....	745
	50. <i>P. brachystachys</i> Bge. ....	746
	51. <i>P. incarnata</i> L. ....	747
	52. <i>P. compacta</i> Steph. ....	748
13130	53. <i>P. dasyshachys</i> Schrenk ....	749
	54. <i>P. physocalyx</i> Bge. ....	750
	55. <i>P. songarica</i> Schrenk ....	753
	56. <i>P. pubiflora</i> Vved. ....	754
	57. <i>P. alatauica</i> Stadlm. ....	755
	58. <i>P. mandshurica</i> Maxim. ....	756
	59. <i>P. grandis</i> M. Pop. ....	756
	60. <i>P. dolichorrhiza</i> Schrenk ....	757
	61. <i>P. fissa</i> Turcz. ....	758
	62. <i>P. lasiostachys</i> Bge. ....	759
13140	63. <i>P. flava</i> Pall. ....	760
	64. <i>P. rubens</i> Steph. ....	760
	65. <i>P. achilleifolia</i> Steph. ....	761
	66. <i>P. talassica</i> Vved. ....	762
	67. <i>P. krylovii</i> Bonati. ....	762
	68. <i>P. dubia</i> B. Fedtsch. ....	763
	69. <i>P. kaufmannii</i> Pinzger ....	764
	70. <i>P. acmodonta</i> Boiss. ....	764
	71. <i>P. daghestanica</i> Bonati ....	765
	72. <i>P. sibthorpii</i> Boiss. ....	766
13150	73. <i>P. chroorrhyncha</i> Vved. ....	767
	74. <i>P. sibirica</i> Vved. ....	767
	75. <i>P. uralensis</i> Vved. ....	768
	76. <i>P. venusta</i> Schangin ....	769
	77. <i>P. schistostegia</i> Vved. ....	770



	78. <i>P. altaica</i> Steph. ....	771
	79. <i>P. mariae</i> Rgl. ....	772
	80. <i>P. schugnana</i> B. Fedtsch. ....	772
	81. <i>P. sylvatica</i> L. ....	773
	82. <i>P. adunca</i> M.B. ....	774
13160	83. <i>P. palustris</i> L. ....	775
	84. <i>P. karoï</i> Freyn. ....	776
	85. <i>P. vlassoviana</i> Stev. ....	776
	86. <i>P. hyperborea</i> Vved. ....	777
	87. <i>P. pennellii</i> Hulten ....	777
	Section 5. <i>Anodon</i> Bge.	
	88. <i>P. willdenovii</i> Vved. ....	778
	89. <i>P. pallasii</i> Vved. ....	781
	90. <i>P. dasyantha</i> Hadac ....	782
	91. <i>P. adamsii</i> Hulten ....	782
	92. <i>P. langsdorffii</i> Fisch. ....	783
13170	93. <i>P. hirsuta</i> L. ....	784
	94. <i>P. oederi</i> Vahl. ....	785
	95. <i>P. alberti</i> Rgl. ....	786
	96. <i>P. exaltata</i> Bess. ....	787
	97. <i>P. hacqueti</i> Graf. ....	788
	98. <i>P. condensata</i> M.B. ....	788
	99. <i>P. atripurpurea</i> Nordm. ....	789
	100. <i>P. pan'utinii</i> E. Busch ....	790
	101. <i>P. balkharica</i> E. Busch ....	791
	102. <i>P. wilhelmsiana</i> Fisch. ....	791
13180	103. <i>P. capitata</i> Adams ....	792
	Section 6. <i>Sceptrum</i> Bge.	
	104. <i>P. sceptrum-carolinum</i> L. ....	793
	Section 7. <i>Diacmanandra</i> Bge.	
	105. <i>P. grandiflora</i> Fisch. ....	794
	Genus 1362. <i>Siphonostegia</i> Benth.	
	1. <i>S. chinensis</i> Benth. ....	796
	Genus 1363. <i>Bungea</i> C.A.M.	
	1. <i>B. trifida</i> (Vahl) C.A.M. ....	798

	2. <i>B. vesiculifera</i> (Herd.) Schischk. ....	799
	Genus 1364. <i>Cymbaria</i> L.	
	1. <i>C. dahurica</i> L. ....	800
	Genus 1365. <i>Cymbochasma</i> (Endl.) Klok. and Zoz	
	1. <i>C. borysthenica</i> (Pall.) Klok. and Zoz. ....	802
	Genus 1366. <i>Lathraea</i> L.	
13188	1. <i>L. squamaria</i> L. ....	804

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Addenda XXI—Diagnoses plantarum novarum in tomo XXII Florae URSS Commemoratarum.

Plates prepared by: L.N.Belianinova: I–III; Z.V. Kobyletskaja: IV, VII–XIII, XXVI, XXXIV–XXXIX; E.S. Gaskevich: V, VI, XXIV, XXXII, XXXIII; N.A. Moiseeva: XIV, XXIII, XXV; and N.N. Korobov; XXVII–XXXI.

## Family CXLI. SOLANACEAE<sup>1</sup> PERS.

- 1 Flowers usually bisexual, regular or slightly zygomorphic. Calyx wholly persistent with fruit or rarely only base persists, while upper part is circumscissile. Corolla 5-merous, variable in form, with regular or irregular limb; its lobes in bud valvate or imbricate, often plicate or twisted. Stamens included, alternating with corolla lobes; anther bilocular, introrse. Ovary bilocular, sometimes nulloclular, or 4-5(6)-locular, divided completely or partially by false septa; carpels placed obliquely to the floral axis; style simple, with entire or bilobed stigma; ovules one to numerous, axile placentation, anatropous or almost amphitropous; embryo circular, spiral, or straight, embedded in endosperm. Herbs, semishrubs, or shrubs, erect or climbing (in the tropics, also trees), with alternate or falsely opposite leaves. Flowers solitary or in cymose inflorescence both terminal and extra-axillary.

The family includes nearly 80 genera and up to 3000 species, distributed in temperate in tropical zones of the globe, especially in tropical America. The family Solanaceae includes many plants of great economic importance: used as food and for medicinal, industrial and decorative purposes as well as a large number of poisonous plants and weeds.

### KEY TO GENERA

1. Acaulescent perennial with rosette of very large (up to 80 cm long) leaves ..... 1315. *Mandragora* L.
- + Plant with well developed stem, leaves much smaller, largest rarely exceeding 20 cm in length ..... 2.
2. Fruit generally succulent or dry leathery berry, sometimes irregularly dehiscent ..... 3.
- + Fruit capsule, dehiscence generally circumscissile (by operculum), rarely by valves ..... 10.
- 2 3. Calyx accrescent, enclosing berry wholly or partially, leaving only apex free ..... 4.
- + Calyx not accrescent in fruit, if accrescent, not covering and remaining much smaller than berry ..... 6.

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<sup>1</sup> Treatment by A.I. Pojarkova, except for p.p. *Lycopersicon*, *Mandragora*, *Scopolia* and *Physochlaina*.

3. Plants strongly armed with numerous acerose prickles covering stem, branches, leaves, and especially calyx; corolla somewhat zygomorphic; one of 5 stamens much longer than others ..... 1309. *Solanum* L. (Sec. *Androceras*).
- + Plants unarmed, flowers regular ..... 4.
4. Calyx closely, but not wholly, covering berry, leaving the apex free; flowers in clusters of 1-3(5) . 1312. *Physaliastrum* Makino.
- + Calyx somewhat inflated in fruit, covering berry entirely, but usually not closely; flowers solitary ..... 5.
5. Calyx partite with lobes auricled at base, enlarging significantly in fruit and loosely covering berry; flowers bluish or dark bluish violet ..... 1322. *Nicandra* Adans.
- + Calyx lobes without auricles, tightly enclosing fruit at base, tube inflated; flowers whitish or yellow ..... 1313. *Physalis* L.
6. Armed bushes 1-2 m in height, mainly with numerous leafy or leafless spiny shoots and violet tubular infundibuliform flowers, solitary or in pairs in leaf axils, or in clusters of 2-6, along with leaves ..... 1316. *Lycium* L.
- + Unarmed herbs or semishrubs (rarely with few prickles on ovary and branches), with campanulate or rotate corolla ..... 7.
7. Herbs with solitary campanulate flowers ..... 1314. *Atropa* L.
- + Semishrubs or herbs with rotate or stellate flowers in bostryces (simple—umbellate, racemose, or compound—corymbose), rarely with solitary flowers ..... 8.
8. Flowers solitary; berry long, many times longer than calyx, with thick compact walls and empty space separating placentae from wall ..... 1311. *Capsicum* L.
- + Flowers usually in bostryces, simple umbellate, racemose, or in compound corymbs; berry succulent, globose to long ellipsoidal or compressed globose; flowers 3-4 cm across if solitary; berry with thick pulp ..... 9.
- 3 9. Flowers yellow; anthers dehiscing by longitudinal slits; leaves deeply pinnatifid ..... 1310. *Lycopersicon* Mill.
- + Flowers violet or white; anthers opening by apical pores ..... 1309. *Solanum* L.
- 10(3). Capsule 4-6 cm long, prickly or tuberculate; flowers solitary, corolla 6-10 or 12-20 cm long, usually white, rarely bluish or violet ..... 1321. *Datura* L.
- + Capsule smooth, much smaller; flowers grouped in inflorescences or solitary ..... 11.
11. Capsule dehiscing by valves; flowers in terminal racemes or lax panicles ..... 1320. *Nicotiana* L.



- + Capsule circumscissile (dehiscing by operculum), flowers solitary or in corymbs or bostryces ..... 12.
- 12. Flowers solitary, campanulate or tubular-campanulate ..... 1318. *Scopolia* Jacq.
- + Flowers grouped in inflorescences, infundibuliform ..... 13.
- 13. Flowers in ebracteate corymbose inflorescence ..... 1319. *Physochlaina* G. Don.
- + Flowers in bracteate inflorescence (helicoid cyme); highly elongated in fruit, appearing like raceme or spike 9. *Hyoscyamus* L.

Tribe 1. SOLANEAE Schlecht. in Linnaea, VII (1832) 66; Dun. in DC Prodr. XIII, 1 (1852) 4; Wettst. in Engl. u. Pr. Pflanzenfam. IV. 3b (1895) 10; Baehni in Candollea, X (1943–1946) 478.—Corolla regular (rarely slightly zygomorphic), in bud valvate or plicate-valvate. Stamens 5 (rarely 4, in some cultivated species 6–8). Ovary bilocular, fruit a berry, indehiscent.

Subtribe 1. SOLANINEAE Dun. in DC. Prodr. XIII, 1 (1852) 4 and 23; Wettst. in Engl. u. Pr. Pflanzenfam. IV, 3b (1895) 18, p. min. p.; Baehni in Candollea, X (1943–1946) 478.—Corolla rotate or subglobose, with very short tube. Calyx after flowering usually not accrescent (rarely expanded). Stamens 5(4–6–8), all fertile; anthers usually dehiscing by two apical pores or connate in tube, introrse, filament usually separating from lower side of narrow connective, embryo curved.

### Genus 1309. *SOLANUM*<sup>1</sup> L.

L. Sp. pl. (1753) 184

- 4 Calyx 5(6–10)-toothed, incised or lobed, persistent in fruit or sometimes enlarged and covering latter. Corolla rotate or stellate with short tube and broad dentate, lobed, or parted limb, mostly regular, sometimes somewhat zygomorphic with enlargement of two lower lobes. Stamens with short filaments; anthers usually connivent, often connate into tube around style, opening usually by apical pores (sometimes transformed into slit), rarely by lateral slits. Fruit bilocular, polyspermous, succulent, rarely pulpy berry. Annual or perennial herbs, semishrubs, or trees in tropics, often with prickles. Leaves entire, lobed, partite, or pinnately compound.

The family Solanaceae consists of nearly 1700 (up to 2000) species, distributed over the whole globe, except in Arctic and Antarctic zones, mainly in tropical and subtropical zones, especially in the Western Hemisphere.

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<sup>1</sup> Plant named by Celsius.

1. Plant with interruptedly pinnatisect leaves and with trailing shoots forming tubers ..... \**S. tuberosum* L.
- + Plant with entire, lobe, or partite leaves, without trailing shoots or with rootstock, not forming tubers ..... 2.
2. Stem, leaves, inflorescence axis, and calyx thickly covered with fine needlelike prickles; calyx after flowering accrescent and closely surrounding ripe berry ..... \**S. rostratum* Dun.
- + Prickles absent, or rare and thick if present; calyx not covering berry, usually not accrescent, always much shorter than berry ... .. 3.
3. Plant covered with stellate hairs; berry rarely less than 7–10 cm long, with thick pulp; flowers 3–4 cm across, mostly solitary; if 2–5 in number, only lowest bisexual and fertile, with style longer than stamens, others sterile (staminate), with style shorter than stamens ..... \**S. melongena* L.
- + Pubescence consisting of simple, not stellate, hairs; berry 5–15 mm long, succulent; flowers small, 7–15 mm across, all bisexual, in simple umbellate, compound corymbose, or almost pyramidal inflorescence ..... 4.
4. Semishrubs with woody rootstock; flowers violet, about 1.5(2) mm across (Sec. *Dulcamara*) ..... 5.
- + Annual herbs; flowers white, 6–9 mm across (Sec. *Morella*) . 14.
5. Stems short, 7–25 cm tall, simple, erect, regularly spaced on very long (2 m or more in length) branching rootstock; inflorescence single, terminal, with 1–3 flowers ..... 1. *S. kieseritzkii* C.A.M.
- 5 + Stems 30–300 cm long, branched, climbing, erect or decumbent, generally forming thick bush; inflorescence terminal and lateral in form of cymose compound corymb or pyramidal-ovate cymose panicle ..... 6.
6. Leaves 5–11-pinnatipartite, sometimes intermixed with entire or lobed leaves; stem erect; inflorescence pyramidal-ovate panicle; anthers free ..... 2. *S. septemlobum* Bge.
- + Leaves entire or with one (rarely two) pair of auricles at base; inflorescence compact or broad expanded cymose compound corymb ..... 7.
7. Stem, branches, peduncles, and pedicels pilose-tomentose, leaves velutinous on both surfaces, ovate, more or less tripartite at base, upper and lower leaves often entire ..... 4. *S. litorale* Raab.
- + Plants subglabrous or sparsely pubescent; when stem and inflorescence tomentose and leaves pubescent, all leaves entire, narrower (ovately) or narrowly lanceolate ..... 8.



8. Leaves cleft at base (rarely parted 2/3) into two small, ovate, obtuse, usually hastate or upcurved lobes; berries globose, small, 4.5–7 mm long ..... 10. *S. asiae-mediae* Pojark.
- + Leaves entire or divided up to midrib at base or almost so, forming one (rarely two) small acuminate segments on each side; berries larger, (6)8–15 mm long ..... 9.
9. Berries oblong, ellipsoid, up to 15 mm long and 8–9 mm broad; corolla pale violet; anthers free; leaves all entire, narrowly ovate ..... 9. *S. megacarpum* Koidz.
- + Berries ovoid, ellipsoid-ovoid, or globose, smaller, up to 10–12 mm long; corolla bright or dark violet; anthers connate; leaves entire or tripartite at base ..... 10.
10. Young branches, leaves, peduncles, and pedicels fleshy; all leaves usually entire, gradually tapering (not drawn into mucro), with obtuse or short-acute apex; branches recumbent ..... 5. *S. marinum* (Bab.) Pojark.
- + Plants not fleshy, leaves usually long-tapering and often acuminate; branches climbing ..... 11.
11. Berries ovoid or ellipsoid-ovoid; uppermost leaves mostly tripartite at base, rarely all leaves tripartite or all entire ..... 3. *S. dulcamara* L.
- + Berries globose, leaves always entire ..... 12.
- 6 12. Leaves narrowly lanceolate to ovate-lanceolate, gradually tapering almost from base toward apex, puberulent to velutinous-tomentose beneath; branches, petioles, and peduncle tomentose or pubescent (a form is occasionally found wherein all parts are subglabrous); inflorescence multiflorous (up to 40–60 flowers), large expanded panicle thrice branched in lower part ..... 8. *S. persicum* Willd.
- + Leaves broader: Ovate or broadly ovate (only toward apex of runners sometimes lanceolate-ovate) more short-tapering upward .... 13.
13. Branches glabrous; mature leaves glabrous beneath or hairy only along ribs, with deeply cordate base; inflorescence a few-flowered (5–20 flowers) compact corymb once or twice branched in lower part; corolla lobes ovate or lanceolate-ovate ..... 6. *S. depilatum* Kitagawa.
- + Branches and lower surface of mature leaves pubescent (rarely with scattered pubescence), leaf base broadly rounded to cordate; inflorescence multiflorous (up to 30–45 flowers) expanded panicle, 3- or 4-branched below; corolla lobes narrowly lanceolate ..... 7. *S. pseudopersicum* Pojark.

- 14(4). Branches, petiole, and parts of inflorescence densely patently villous with mixed simple and glandular, capitate sticky hairs; berries light yellow, somewhat elongated ..... \**S. luteum* Mill.
- + Branches and petioles glabrous or somewhat densely pubescent with simple (without stalked glands), short, antrorse, appressed, or patent hairs, sometimes also with longer hispid hairs; berries globose, black (rarely green), light red, reddish brown, or yellow ..... 15.
15. Ripe berries black (rarely green) ..... 21.
- + Ripe fruits light red, reddish brown, or yellow ..... 16.
16. Peduncles 5–10(12) mm long, shorter than or as long as pedicels; fruits light orange or vermilion red; inflorescence 2–4-flowered, umbellate ..... 17.
- + Peduncles 8–25 mm long, all or most of them (except those on terminal branches) markedly (often 2–2 1/2 times) as long as pedicels; fruits reddish brown or yellow; inflorescence 4–8-flowered, more or less racemose (with spaced pedicels) ..... 19.
17. Leaves almost from apex coarsely sinuate-dentate, mature ones rather densely pubescent, ovate or elliptic-ovate, short acuminate, mostly with rounded base ..... *S. alatum* Moench.
- 7 + Leaves entire or with one or two basal teeth, or if intermixed with sinuate-dentate leaves, lamina oblong triangular-ovate, long-acuminate, and with cuneate base ..... 18.
18. Leaves ovate, with rounded or rounded-cuneate base, rather short-acuminate toward apex, all entire or a few in lower part with one or two teeth on one or both sides ..... 17. *S. woronowii* Pojark.
- + Leaves oblong- or triangular-ovate, generally long-acuminate toward apex with narrow cuneate base, partly entire, partly with one or two teeth near base, sometimes with a few sinuate-dentate leaves ..... 16. *S. zelenetskii* Pojark.
19. Leaves almost all entire, only a few with one tooth above base on one or both sides, large, up to 8 cm long on branches ..... *S. pseudoflavum* Pojark.
- + Leaves with sinuate-dentate margin with some sinuate, smaller leaves, not longer than 5–5.5 cm ..... 20.
20. Mature fruits brownish red; leaves thick, all or most of them broadly elliptical or partly ovate-elliptical, rather short-tapering toward apex ..... 15. *S. olgaeum* Pojark.
- + Berries yellow, leaves narrowly elliptical, long-acuminate ..... 14. *S. transcaucasicum* Pojark.
21. Branches and petioles densely pubescent with antrorse, soft, patent hairs; leaves sinuate-dentate, with 3–6(7) well defined teeth on each

side, more or less densely pubescent underneath ..... 12. *S. decipiens* Opiz.

- + Branches glabrous or with sparse antrorse appressed hairs; leaves entire, sinuate or sinuate-dentate, with 2-3 teeth below middle, glabrous or subglabrous ..... 22.
- 22. Branches 4-angled, with well defined serrated ribs; peduncle short, 1-1.5 cm long, in fruit little longer than pedicels, bostryx bilateral, with pedicels pendant along both sides of peduncle; leaves ovate, with 2-3 unequal teeth on each side ..... 13. *S. judaicum* Bess.
- + Branches compressed-cylindrical, with slightly marked nerves, peduncle (1.5). 2-5.5 cm long, in fruit markedly longer than pedicels; bostryx umbellate or slightly racemose-corymbose, not bilateral; leaves mostly elongated, ovate-elliptical, entire, with a few sinuate or slightly sinuate-dentate ..... 11. *S. nigrum* L.

8 Subgenus 1. *EUSOLANUM* Bitter in Hegi, Illustr. Fl. Mittel-Eur. V, 4 (1927) 2583.—Sect. *Pachystemonum* Dun. in DC. Prodr. XIII, 1 (1852) 28, 31, p.p. (excl. sect. *Lycianthes*); Wettst. in Pflanzenfam. IV, 3b, 22.—Anthers ellipsoid or linear; apex generally obtuse. Inflorescence terminal, leaf-opposed or extra-axillary. Plants diverse in appearance, unarmed.

Section 1. *Tuberarium* (Dun.) Bitter in Fedde, Repert. Sp. nov. X (1912) 531; Hegi, Illustr. Fl. Mittel-Eur. V, 4, 2584; Correll, Sect. Tuber. gen. Solan. 18.—Subsect. *Tuberarium* § *Potatoe* Dun. in DC. Prodr. XIII, 1 (1852) 28.—*Solanopsis* Börner, Abh. Naturf. Ver. Bremen, XXI (1912) 282 p.p.—Corolla stellate or rotate, usually rather large or medium sized, mostly white or reddish, or bluish to dark violet. Filaments short, anthers lanceolate-elliptical, connivent, dehiscing by apical pores. Berries mostly globose. Perennial plants, mostly with trailing shoots forming tubers, with interruptedly pinnatipartite leaves (rarely with lesser incision) and inflorescences terminal in beginning, once or twice-branched. Pedicels articulate.

Species of this section are distributed almost exclusively in South and Central America, a few of them growing in the Canary Islands.

\**S. tuberosum* L. Sp. pl. (1753) 185; Schmalh. Fl. II, 249; Syreistsch. Ill. Fl. Mosk. gub. III, 119; Grossh. Fl. Kavk. III, 355; Kom. in Tr. Glavn. bot. sada, XXXIX, 1, 105; Vznachn. rosl. UkrSSR, 370.—*Lycopersicon tuberosum* Mill. Gard. Dict. ed. VIII (1768) No. 8.—*lc.*: Rchb. Ic. fl. Germ. XX, tab. MDCXXXIII, f. I, II; Syreistsch. fig. on p. 119; in Tr. prikl. bot. i sel. XV, 2, plates I-III. Potato.

Cultivated as an annual. Plants with fibrous roots and trailing shoots, forming tubers. Stem 0.5-1 m tall, branched, cylindrical below, upper



part along with branches slightly angular, shortly appressed hairy, green or generally colored with anthocyanin. Leaves interruptedly pinnatisect, with 7–11 large lobes, alternating with small ones; lobes mostly ovate, acuminate, with oblique, usually cordate base tapering into petiole, upper surface subglabrous, lower pubescent. Flowers in terminal inflorescence with two or three bostryces. Pedicels articulate near middle. Calyx with five lanceolate-acuminate lobes. Corolla white, reddish, violet, or bluish with short tube and broad, plicate, 5-angular or shallowly 5-lobed limb, 2–3(4) cm in diameter. Anthers yellow. Style curved at base, with capitate stigma. Berry globose, green, 1.5–2 cm in diameter. Flowering from June to July.

Many varieties propagated in fields and vegetable gardens.—All areas, 9 excepting the major part of Arctic regions. *General distribution*: native of South America (Chile), cultivated in all temperate zones of the globe. Described apparently from cultivated European specimens (indexed 'Peru'). Type in London.

*Economic importance.* The potato is one of the most valuable crops in the national economy of the USSR. The importance of the plant is determined by its high yield as well as by its varied use in the economy. The potato yields, per unit area, nearly three times as much starch and other dry matter as compared to cereals. The main use of the tuber is its consumption as a food. The use of potato tubers and potato starch in cookery is extremely varied. Its dietetic importance is determined by its fairly high content of vitamin C as well as vitamins of the B group. It is also a valuable feed for cattle and poultry and is of special importance in pig breeding. It is a very important source of starch which finds varied use in the textile and food industries and also serves as a raw material for obtaining dextrin, spirit, glucose, and synthetic rubber. The potato occupies a leading place in crop rotation because it has a beneficial effect on the yield of succeeding crops.

The principal content of potato tubers is starch which constitutes 60–80% of the dry matter or 95–99% of all its carbohydrates. The resting tubers have a low sugar content but on prolonged storage this can reach 7–8%. These sugars are represented by glucose (68% of all sugars), sucrose (28%), and fructose (4%). The average nitrogen content in the tubers is 1.27% (0.44–2.34%) of their dry weight. The major portion is found in protein, aminoacids, amides, and nitrogenous bases. The proportion of the toxic specific glucoalkaloid solanine ( $C_{45}H_{71}O_{15}N$ ) is 0.1%, its content being the lowest in tubers (normally 0.002–0.01%); protein nitrogen constitutes 44–46% of the total nitrogen content. The amides present are asparagine and glutamine, the nitrogen of which constitutes 20–45% of the total nitrogen content. The tubers contain a small quantity of the following aminoacids and nitrogenous bases in the free state; arginine,

lysine, leucine, tyrosine, tryptophane, histidine, choline, acetylcholine, trigonelline, allantoin, xanthine, hypoxanthine, guanine, adenine, cadaverine, and glutathione. The protein tuberin found in the potato belongs to the group of salt-soluble proteins (globulins) and is distinguished by a high content of aminoacids essential for humans and animals (arginine 5.2%, cystine 5.4%, histidine 4.1%, and lysine 4.7%). This explains the highly nutritive properties of potato protein that exceeds the food value of cereal proteins. The mineral content of these tubers averages 4.36% (2.12–7.48%)  
 10 of their dry weight; their ash is rich in potassium (44–74%) and phosphorus. The cellulose in the tubers is 0.28–3.48% (of fresh weight), pentosans 0.74–0.95%, and fat 0.04–0.94%; the acids present are oxalic and citric; a small quantity of carotene has been discovered (Prokoshev. Biokh. kartof. 1947; Sb. "Kartofel", Ed. Chmora and Arnautov, 1953).

Section 2. *Dulcamara* (Dun.) Bitter in Hegi, Illustr. Fl. Mittel-Eur. V, 4 (1927) 2583.—Subsect. *Dulcamara* § *Dulcamara* Dun. in DC. Prodr. XIII, 1 (1852) 28, 68—*Dulcamara* Moench, Meth. pl. (1794) 514.—Corolla regular, with plicate 5-angular, 5-lobed, or 5-partite limb, usually violet, rarely white. Stamens with short free filaments and free or connate anthers dehiscing by apical pore, sometimes transforming into slit. Berries small (up to 2 cm long), mostly red. Perennials or semishrubs, rarely shrubs, sometimes with rhizomes, not forming tubers. Leaves entire or at base tri-(penta)-fid or partite, and some 5–7 pinnatipartite. Inflorescence terminal, leaf-opposed or extra-axillary; pedicels articulate at base.

Species of this section are native to Eurasia, Central and South America.

Series 1. *Kieseritzkiana* Pojark.—Flowers 1–2(3) in terminal bostryx with short (mostly shorter than pedicels) peduncle. Anthers conically connivent or partly connate, dehiscing by two apical pores, later transforming into short slits. Berry (? dark) red. Undershrub with long, woody branched rootstock producing short, simple, closely spaced branches, each ending in inflorescence. Leaves entire, lanceolate.

The series is monotypic.

1. *S. kieseritzkii* C.A.M. Verz. Pflanz. Cauc. Casp. Meer. (1831) 113; Ldb. Fl. Ross. III, 188; Dun. in DC. Prodr. XIII, 1, 78; Boiss. Fl. or. IV, 285; Grossh. Fl. Kavk. III, 355.

Perennial semishrub with woody, brown, slender, and long (up to 2 m or more) branched rootstock producing regularly spaced, ascending or erect, short (10–25 cm long), simple branches with yellowish brown longitudinally rugose bark; young branches herbaceous, glabrous, with four thin nerves, densely leafy. Leaves few, thin (dry ones chartaceous), subglabrous, bright green above, pale beneath, up to 11 cm long and 6.5 cm

broad, from elliptical-ovate, sharply tapering above and mucronate, to elliptical and narrowly elliptical-lanceolate, long-acuminate, entire, with cuneate base, decurrent on slender petiole  $1/4-1/3(1/2)$  as long as lamina. Flowers 1-3 in terminal bostryx on short, 3-10 mm long peduncle. Pedicels recurved, 7-17 mm long, slender, thickened above. Calyx glabrous broad, shallowly 5-lobed or dentate, with broad triangular lobes or teeth, entire or bidentate above. Corolla 16-20 mm across throat with five pairs of green spots; lobes five, triangular-lanceolate and deflexed, white-ciliate along margin and outside on tip. Anthers linear, 3.5-5 mm long, free (or connate in middle). Style thin, longer than stamens. Berry about 1 cm in diameter, globose, apparently dark red (according to Grossheim, 'blackish'). Seeds flat, orbicular-reniform, about 3.5 mm long and broad. Flowering June-July. Fruiting from August (Table 1, Fig. 1).

In shady damp forests of the lower mountainous zone.—*Caucasus*: Talysh. Endemic. Described from the environs of Lenkoran. Type in Lenin-grad.

*Note.* The only species closely resembling this Talysh relict is *S. bifurcum* Hochst. (Ethiopia and Yemen), which also occupies a special position in the section *Dulcamara*. This is a shrub with woody branches and a terminal inflorescence on a long peduncle, sometimes dichotomously branched, with a fasciculate bostryx on each branch. The bostryx is simple on weak branches, having, as in our species, only 2-3 flowers. The floral structure and leaf form are very similar to those of *S. kieseritzkii*.

Series 2. *Septemloba* Pojark.—Inflorescence pyramidal, almost ovate panicle. Anthers conically connivent, but free. Leaves 5 to 11-pinnatipartite to lacinate, often intermixed with entire or lobed ones. Stem erect, often woody. Branches herbaceous.

A monotypic series, on the one hand very close to the Cycle *Dulcamara* and on the other hand to the group of the South American (Chile, Peru) species grouped around *S. quercifolium* L. and *S. radicans* L. fil., to which *S. septemlobum* is not only surprisingly similar in external appearance (due to 5-9-partite leaves), but also identical in the structure of the inflorescence and flowers with free anthers.

2. *S. septemlobum* Bge. in Mém. présent. Acad. Sc. St.-Pétersb. div. sav. II (1835) 122; Dun. in DC. Prodr. XIII, 1, 71; Kom. Fl. Man'chzh. III, 405.

Perennial (sometimes undershrub?). Plant with woody rootstock, branches straight, strong, closely branched, densely leafy, young branches green, herbaceous, usually sparsely hairy, finely ribbed, two-three year old branches covered with brownish yellow, longitudinally finely rugose bark and old branches with dark brown exfoliated bark. Leaves up to 9 cm long and 6-6.5 cm broad, with scattered hairs on both surfaces,



ovate or oblong-ovate, acuminate, with cuneate or rarely rounded base, far decurrent along petiole, most leaves deeply incised (up to pinnatisect) into 5–9(11) lobes; mostly lanceolate, rarely ovate-lanceolate, acuminate, entire; leaves sometimes subentire (apical and lower), with a few teeth or shallowly lobed. Petiole  $(1/7)1/5$ – $2/7(1/3)$  as long as lamina, glabrous or pilose. Inflorescence terminal and leaf-opposed, somewhat expanded almost pyramidal panicle leaf-opposed, somewhat expanded, almost pyramidal panicle twice–thrice dichotomously branched in lower portion, bearing rarely more than 20–25 (up to 35) flowers; peduncles 1.5–3.5 cm long. Pedicels 5–10 mm long, distinctly thickened above, both peduncle and pedicel sparsely hairy or glabrous. Corolla 13–18 mm across, lilac, with five pairs of green spots at base of limb, with ovate or ovate-triangular lobes. Stamens with free, short (about 3.5 mm long), rather broad (about 1.5 mm) anthers and about 1 mm long filaments. Berries bright red, more or less ovoid or ovoid-ellipsoid, 8–12 mm long, 5–7 mm broad. Seeds 2.25–2.5 mm long, 2–2.25 mm broad, flat, reniform. Flowering July–August. Fruiting from August.

Along banks of rivers and lakes, as a weed in the steppe, in kitchen gardens, and near habitations, mainly in clayey soils.—*Eastern Siberia*: Dauriya (known only from Achin steppe). *General distribution*: Mongolia (in eastern and southern parts), China, Tibet (Hansu). Described from Peking environs. Type in Paris, isotype in Leningrad.

*Economic importance*. Ornamental plant.

Cycle 1. *Dulcamara* Pojark.—Flowers in corymbose cymose panicles, with distinct (1.5–8 cm long) peduncles. Anthers mostly connate along whole length into conical tube, rarely free. Berry bright red. Perennials, sometimes semishrubs, rarely shrubs, with climbing stems. Leaves entire or with two small lobes in lower part.

The Cycle is represented by several (about 10) similar geographical races, distributed in regions of Eurasia. Besides those given below, the following should also be included here: *S. japonense* Nakai (*S. nipponense* Makino)—Japan and *S. lyratum* Thunb.—almost throughout South-east Asia.

3. *S. dulcamara* L. Sp. pl. (1753) 185; Ldb. Fl. Ross. III, 187; Dun. in DC. Prodr. XII, 1, 78 (excl. var.  $\zeta$  and  $\nu$ ); Boiss. Fl. or. IV, 285, p.p.;
- 15 Schmalh. Fl. II, 249, p. max. p.; Grossh. Fl. Kavk. III, 355; Nekras. in Fl. Yugo-Vost. VI, 187, p. min. p.; Hegi, Illustr. Fl. Mittel-Eur. V, 4, 2589.—*Dulcamara flexuosa* Monech, Meth. pl. (1794) 514.—*S. scandens* auct.: Gleditsch. Reise, II (1791) 4, 56, 126, non L. fil.—*Dulcamara lig-nosa* Gilib. Fl. lith. I (1781) 37.—*S. persicum* auct.: Schmalh. l.c. 250, p. min. p. non Willd.—*S. dulcamara* var. *persicum* Dippel, Laubholz. I (1889) 21, non O. Ktze. nec. Trautv.; Fedtsch. and Fler. Fl. Evrop.



Ross. 842, p.p.—*Ic.*: Rechb. *Ic. fl. Germ.* XX, tab. MDCXXXIII, f. I, II; Syreitsch. *Ill. fl. Mosk. gub. fig.* on p. 121; Fedtsch. and Fler. *I.c. fig.* 770; Hegi, *I.c. tab.* 232, f. 3; f. 3412, 3413, 3414; Javorka, *Iconogr. Fl. Hung. f.* 3221 i.—*Exs.*: *Fl. Finl. exs.* No. 906; *Fl. pol. exs.* No. 465<sup>a</sup>, 465<sup>b</sup>; *Fl. exs. austro-hung.* No 3290.

Perennial. Undershrub branched from base. Rootstock woody, creeping, profusely branched, in places swollen into tubers. Stems 0.3–1.5(2–3) m tall, up to 2–2.5(5) cm thick at base, climbing, often flexuous, covered with gray, younger stems with ochereous yellow, longitudinally rugose bark, base woody. Perennial, profusely branched, with divaricate branches, sparsely appressed hairy or subglabrous. Leaves 2.5–12 cm long and 0.6–10 cm broad (mostly 5–9 cm long and 2.5–5 cm broad), sparsely puberulent on both surfaces, rarely glabrous or puberulent, uppermost leaves incised deeply, mostly at base, more often up to midrib, with one or rarely two pairs of small, ovate or lanceolate, acuminate lobes; terminal lobe large, ovate or lanceolate, usually tapering rather sharply above middle, with mucronate or gradually narrowing acuminate tip; remaining leaves entire, ovate or lanceolate, narrowed above middle into long acuminate tip, usually with truncate-rounded, shallowly (rarely deeply) cordate, or sometimes cuneate base; sometimes all leaves entire (var. *persicum* Dippel = var. *indivisum* Boiss. p.p.) or tripartite; petiole 1/3–2/3 as long as lamina. Inflorescence extra-axillary, leaf-opposed, somewhat disarranged 6–25(30) flowered in drooping cymose panicle, at base once or twice dichotomously branched, forming terminal bostryces; peduncles 2.5–5 cm long, with sparse appressed hairs. Pedicels 6–15 mm long, swollen above, usually glabrous. Calyx 5-toothed. Corolla 12–18 mm across, lilac (rarely white or pink), 8.5–10 mm long, 5-partite; lobes narrow, about 9 mm long and 3.5 mm broad, lanceolate, long acuminate, spreading at first, then recurved, with two green, white-bordered spots below base. Anthers narrow (6 times as long as broad), connate, filaments short. Berry bright red (rarely greenish yellow), shining, ovoid or ellipsoid, obtuse or sometimes apiculate, in dry form (6)7–12 mm  
16 long, (4.5)5–8 mm broad. Seeds orbicular-reniform, flat, finely reticulate. Flowering from first half of June to September. Fruiting July to September.

In damp forests and bushy thickets, especially in alder groves, along banks of rivulets, lakes, ponds, and on moist grasslands. *European USSR*: Karelian Lapland (extreme south), Dvina-Pechora, Baltic Region, Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Upper Dniester, Bessarabia, Black Sea, Crimea (very rarely on the southern shore, introduced?), Lower Don, rarely; *Caucasus*: Ciscaucasia (Taman—introduced); *Western Siberia*: Ob' Region (southwestern section), Upper Tobol (western section), Irtysh, single locality in Barnaul Region, introduced?); *Soviet Central Asia*: Aral-Caspian Region (very rare,

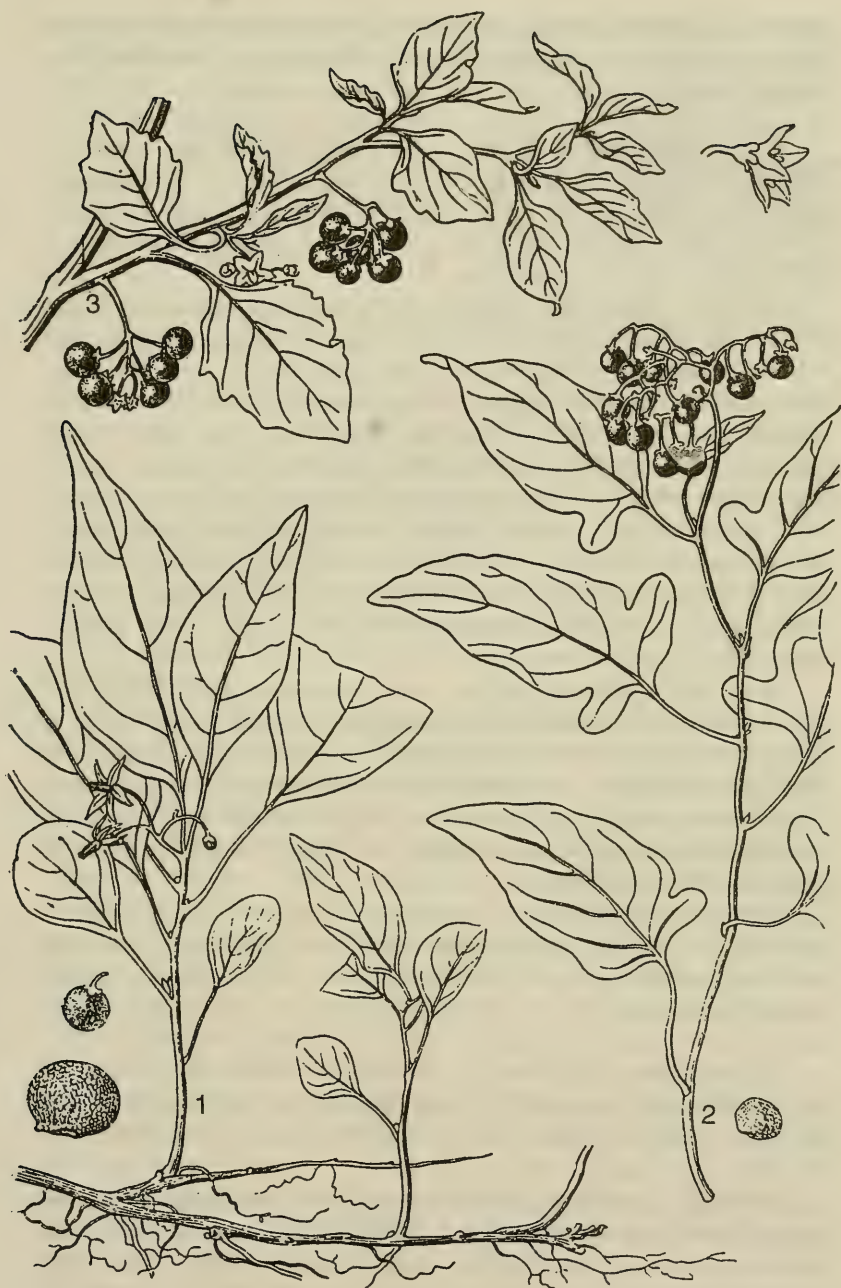


Plate I.

1. *Solanum kieseritzkii* C.A.M., fruit and seed;—2. *S. asiae-mediae*, Pojark., seed;  
—3. *S. algae*, Pojark., flower.

introduced). *General distribution*: Europe, all regions, Balkan States-Asia Minor; naturalized in some places in North America. Described from Europe. Type in London.

4. *S. litorale* Raab in Flora, II (1819) 414.—*S. dulcamara* var. *villosissimum* Desv. Observ. pl. d'Angers (1818) 112.—*S. dulcamara*  $\beta$ . *tomentosum* Koch, Syn. fl. Germ. and Helv. (1837) 507.—*S. dulcamara*  $\beta$ . *litorale* Rchb. Ic. bot. X (1862) 7; Abrom. Fl. Ost.- u. Westpreuss. I, 2, 588; Hegi, Illustr. Fl. Mittel-Eur. V, 4, 2590.

Cultivated. Shrub with climbing woody stems, grayish due to dense, soft, tomentose-pilose pubescence on branches, petioles, peduncles, and pedicels. Branches erect becoming slightly angular above, with thin nerves along angles. Leaves bluish green, densely velutinous on both surfaces, elliptical-ovate or ovate, lower ones with rounded or cordate base, in lower part often with (one) two auriculate lobes, upper leaves usually deeply incised at base, often up to midrib, forming two (rarely one) ovate, acute or obtuse (not acuminate), hastate, sagittate or upcurved lobes. Inflorescence leaf-opposed, branched, (12)15–40-flowered, on 2–4 cm long peduncles. Calyx appressed pilose on outer surface, with broad triangular or sometimes almost obscure teeth. Corolla similar to *S. dulcamara*. Berry broader, ovoid. Flowering from June.

Along sandy seashores and on dunes.—*European USSR*: Baltic Region (reported by Abromeit from seashore in Kaliningrad Region). *General distribution*: Central Europe (Switzerland, Tyrol, southern seashore of the Baltic Sea, in the last case, possibly introduced); western Mediterranean, Balkan States-Asia Minor (northwestern region: shores of the Adriatic Sea). Described from Switzerland from Lake Geneva and the environs of Lausanne. Type unknown.

*Note*. This species is rather common in southern Europe, where it is confined mainly to sandy sea and lake shores and dunes. However, apart from coastal regions, it is also found in dry habitats. In our country probably introduced.

17 5. *S. marinum* (Bab.) Pojark. comb. nova.—*S. dulcamara*  $\gamma$ . *marinum* Bab. in Man. Brit. Bot. (1843) 210; Abrom. Fl. Ost.- u. Westpreuss. I, 2, 588; Hegi, Illustr. Fl. Mittel-Eur. V, 4, 2591.—*Exs.*: Dorfl. Herb. norm No. 5300.

Perennial. Undershrub; distinguished from *S. dulcamara* L. by decumbent stems and fleshy young branches and leaves, sometimes with scattered, antrorse appressed hairs; petioles thick, short, 2/13–1/4 as long as lamina; lamina ovate or elliptical, in lower leaves of branches oblong-elliptical, gradually or rather sharply tapering toward broad, acute or obtuse tip (not acuminate or mucronate), base cuneate, rounded or shallowly



cordate, usually entire, rarely a few apical leaves with one or both sides having very shallow sinus in lower part. Inflorescence leaf-opposed, with fleshy axis. Otherwise, similar to *S. dulcamara*. Flowering from June.

In undergrowths on seashores and dunes. *European USSR*: Baltic Region (on Esel Island; reported by Abromeit from several places in the coastal areas of Kaliningrad Region). *General distribution*: Scandinavia (southern parts), Atlantic Europe (Irish coast and southern parts of Great Britain). Described (as variety) from Ireland and southern England. Type in London.

*Note.* *S. maritimum* is a littoral race, native to the shores of the Atlantic Ocean and the North and Baltic Seas.

6. *S. depilatum* Kitagawa, Lineam. fl. Manshur. (1939) 390.—*S. dulcamara* auct. (non L.): M.B. Fl. taur.-cauc. I (1808) 165; Ldb. Fl. Ross. III, 187, p. min. p.; O. and B. Fedtsch. Perech. rast. Turkest. 5, 75, p. max. p.; Kom. and Alis. Opred. rast. Dal'nevost. kr. II, 915.—*S. persicum* auct. (non Roem. and Schult.): Ldb. Fl. alt. I (1829) 237; Fl. Ross. III, 187, p.p.; Schmalh. Fl. II, 250; Kryl. Fl. Zap. Sib. X, 2406.—*S. dulcamara* var. *persicum* Trautv. in Bull. Soc. Nat. Mosc. IV (1866) 431; in Tr. SPb. bot. sada, X, 2, 422, non O. Ktze, nec Dippel; Nekras, in Fl. Yugo-Vost. V, 187.—*S. dulcamara* var. *ovatum* auct. (non Dun.): Kom. Fl. Man'chzh. III (1907) 404.

Perennial (undershrub). In external appearance very similar to entire-leaf form of *S. dulcamara* L., but less branched. Young shoots herbaceous, glabrous or sparsely covered with antrorse appressed hairs. Leaves up to 10(13) cm long and 6.5(8) cm broad, often subglabrous or puberulent along veins, sometimes only young leaves finely puberulent beneath, margin short-ciliate, always entire, ovate or broadly ovate, more short-acuminate compared with foregoing species, usually with or without short  
18 mucro, only in upper part of shoots often oblong or lanceolate-ovate, long acuminate. Petioles 1/3–1/2 as long as lamina. Inflorescence flat corymbose cymose panicle, in lower part once or twice-dichotomously branched, 5–20(25)-flowered; peduncles 2.5–5.5 cm long, pedicels, 5–12(15) mm long, slightly thickened above, both, as also calyx, glabrous or with isolated hairs. Calyx teeth broadly triangular. Corolla 17–22 mm across, with 6–8 mm long and 3–6 mm broad lobes, lanceolate-ovate, oblong-ovate to ovate or triangular-ovate, puberulent on outside near apex and along margin, especially in bud. Berries bright red, globose or rarely ovoid-globose, on drooping stalks, 7–12(15) mm long. Flowering June to September. Fruiting from July.

Along banks of rivers, lakes, ponds, along boggy margins, in flood meadows, coastal bushy thickets, willow groves, and also along ditches, kitchen gardens, near hedges.—*European USSR*: Dvina-Pechora (eastern

region), Volga-Kama (eastern region), Volga-Don, Trans-Volga. Black Sea Region (eastern part), Crimea, Lower Volga, Lower Don; *Western Siberia*: Ob' Region (up to 61°N), Upper Tobol, Irtysh, Altai; *Eastern Siberia*: Yenisei (southern section, up to 64 1/2°N), Lena-Kolyma (southern region), Angara-Sayan, Dauria (western part, very rarely in the east); *Soviet Far East*: Zeya-Bureya (very rare), Ussuri (very rare); *Soviet Central Asia*: Dzh.-Tarbagatai, rare in other regions, introduced originally; Syr Darya (Tashkent oasis), Tien Shan (western parts and the neighboring regions), Pamiro-Alai. *General distribution*: Dzh.-Kashgar (Kuldzha), Mongolia (northern region), China (northern region). Described from the Heiho Province in northern Manchuria. Type unknown.

Note. *S. depilatum* Kitag., a native of Siberia and the eastern regions of the European part of the USSR, until now has been identified with *S. persicum* Roem. and Schult., from which it is distinguished by the glabrous or subglabrous stem, branches, leaves, and inflorescences; broad lamina with deeply cordate base; few-flowered flat-topped inflorescences; and broad corolla lobes. The characteristics distinguishing *S. depilatum* from superficially similar *S. dulcamara*, especially its undivided leaf form, are broader, always entire leaves; globose fruits; and broader corolla lobes (see also note under *S. pseudopersicum*).

7. *S. pseudopersicum* Pojark. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR XVII (1955).—*S. persicum* auct. fl. cauc. p.p. non Roem. and Schult. C.A.M. Verz. Pflanz. Cauc. Casp. Meer (1831) 112, p.p.; Ldb. Fl. Ross. III, 187, p.p.; Grossh. Fl. Kavk. III, 355, p.p.—*S. dulcamara*  $\beta$ . *indivisum* Boiss. Fl. or. IV (1879) 285, p.p.

Perennial (semishrub). Plant with woody, flexuous tuberous rhizomes. Branches finely ribbed, young branches herbaceous, more or less densely pubescent with crispate hairs, tips of runners usually tomentose-villous; year-old branches woody, often diffusely villous, like older branches  
 19 covered with ocherous yellow bark. Leaves all entire, up to 11 cm long and 6.5 cm broad, bright green above, lighter underneath and usually sparsely puberulent or diffusely villous, often subglabrous; very rarely mature leaves rather densely pubescent, less hairy on upper surface than beneath, mostly ovate, base cordate or rarely truncate-rounded, gradually tapering upward and often with short or long mucro at tip, rarely mainly lower leaves broadly ovate or ovate-lanceolate (lanceolate in upper part of shoots). Petiole 2/7–2/5(1/2) as long as lamina, glabrous, or somewhat pilose. Inflorescence 3–4 times dichotomously branched, usually expanded 12–30(45)-flowered cymose panicle; peduncles terminal and extra-axillary, 2.5–4(6.5) cm long, glabrous, or diffusely, rarely somewhat densely, covered with crispate hairs. Pedicels markedly thickened at tip, 5–11(13) mm long, glabrous or sparsely hairy. Calyx rather densely

appressed-hairy outside, with 6 short and broad, sometimes obscurely marked, teeth. Corolla bright violet, 15–18(22) mm across, lobes lanceolate or ovate-lanceolate, tapering above with truncate apex, 6.5–8 mm long and 2.5–3.5 mm broad, glabrous outside or puberulent near tip, margin short-ciliate. Anthers connate into conical tube. Berry globose, 6–9 mm in diameter, bright red. Seeds finely reticulate, about 2.5 mm long and broad. Flowering from June to September. Fruiting from July to November.

Along banks of rivers and rivulets, in damp forests and bushy thickets.—*Caucasus*: Ciscaucasia, western, southern and eastern Transcaucasia, usually in the western region and apparently rarely in the eastern region. *General distribution*: Balkan States-Asia Minor, Armenia-Kurdistan. Described from northern Caucasus (Mount Mashuk). Type in Leningrad.

*Note*. Morphologically the species is most similar to *S. depilatum*, from which it is distinguished by many-flowered expanded inflorescences (similar to that of *S. persicum*), leaf shape, and also pubescent or even tomentose-villous shoots. It is distinguished from *S. persicum* by broader leaves and usually glabrous few-flowered inflorescences.

8. *S. persicum* Wild. ex Roem. and Schult. Syst. veg. IV (1819) 662; Ldb. Fl. Ross. III, 187, p.p.; Grossh. Fl. Kavk. III, 355, p.p.—*S. dulcamara*  $\beta$ . *indivisum* Boiss. Fl. or. IV (1879) 285, p.p.—*S. dulcamara* var. *persicum* O. Ktze. in Tr. SPb. bot. sada, X, 1 (1887) 222; Trautv. in Tr. SPb. bot. sada, X, 1, 123, non Trautv. (1866 and 1889).—*S. persicum* var. *assimile* Grossh. l.c. 355, non Boiss.

20 Perennial, shrub. Profusely branched semishrub or shrub, with woody rootstock and rooting at lower parts of stems; branches long (up to 2 m and more), often flexuous, with thin but prominent ribs, herbaceous when young, patently crispate-villous to villous-tomentose, rarely subglabrous; year-old and older branches with ocherous yellow bark, pubescence often persisting even in two-year-old branches. Leaves all entire, up to 11(14) cm long and 5.5(6) cm broad, lanceolate-ovate to narrowly lanceolate, sometimes oblong-ovate in lower part of branches, usually gradually tapering upward with truncate apex, base rounded or rounded-truncate, rarely cordate, upper surface bright green, diffusely or densely puberulent, underneath grayish or yellowish, densely velutinous to diffusely villous; petiole (1/4)2/7–2/5 as long as lamina, from diffusely villous to villous-tomentose. Inflorescence terminal and extra-axillary, rarely partly leaf-opposed, forming broad, expanded corymbose panicle up to 13 cm in diameter, thrice dichotomously branched at least in lower part, 15–40(60)-flowered; peduncles (2)3.5–7.5 cm long, like the main axis patently (rarely semi-appressed) villous with crispate hairs or villous-tomentose, rarely subglabrous. Pedicels 6–11 mm long, slender, somewhat thickened above,



usually less densely semi-appressed hairy, sometimes subglabrous. Calyx with triangular lobes or teeth, sometimes obscure, more or less densely appressed hairy. Corolla bright violet, 16–18(20) mm across, with lanceolate lobes 6.5–8 mm long and 2.5–3.5 mm broad at base, puberulent outside, especially near apex, margin densely ciliolate. Anthers connate. Berries globose, 6–9(10) mm in diameter, fruiting pedicel slightly thickened above. Seeds reniform, finely reticulate, about 2–2.5 mm long, 2 mm broad. Flowering from June to August. Fruiting from July to October.

Along bottoms of ravines, banks of streams and rivulets, coastal thickets, damp forests, alpine pastures, gardens and kitchen gardens, near habitations at all altitudes up to the alpine zone. *European USSR*: Lower reaches of Volga; *Caucasus*: Dagestan, eastern Transcaucasia (mainly eastern part), southern Transcaucasia (rare), Talysh; *Soviet Central Asia*: mountainous Turkmenia (Kopet-Dag). *General distribution*: Armenia-Kurdistan (eastern part), Iran (northern region). Described from Iran. Type in Berlin.

9. *S. megacarpum* Koidz. in. Acta phytotax. and geobot. IV (1935) 159; Sugawara, Illustr. Fl. Sagh. IV, 1621; Vorobev, O fl. Kurilsk. o-vov; 37.—*S. dulcamara* γ. *macrocarpum* Maxim. in Ind. sem. hort. Petrop. Suppl. (1869) 26; Miyabe and Miyake, Fl. Sagh. (1915) 339.—*S. macrocarpum* Kudo in Kudo and Susaki, Med. pl. Hokkaido (1922) tab. 84, non L. (1771), nec Molina (1810).—*S. nipponense* var. *macrocarpum* Makino and Nemoto, Fl. Jap. ed. 2 (1931) 1050.—*S. macrocarpum* Koidz. in Acta phytotax. and geobot. I (1932) 23; Ohwi in Acta phytotax. and geobot. I, 123, non L. (1771), nec Molina (1810).  *Ic.*: Sugawara, l.c. tab. 742; Kudo, l.c. tab. 84.

- 21 Perennial. Semishrub 60–150 cm tall, with long, creeping, woody rhizome, branched at base, up to 1.5 cm in diameter. Branches with thin sharp angles, young branches herbaceous, angles densely antrorsely hairy. Leaves up to 12 cm long and 7 cm broad, sparsely puberulent along veins or subglabrous beneath, margin uneven because of short cilia, all leaves entire, oblong-ovate, sometimes mixed with ovate leaves in lower part of branches, more or less gradually tapering upward, rarely short-mucronate, base rounded-truncate or sometimes shallowly cordate, decurrent on petiole; petiole (1/5)1/4–2/5 as long as lamina, ribbed, ribs crispate hairy along margin. Inflorescence terminal and extra-axillary cymes, forming flat-topped corymbose panicle, dichotomously branched at base, 5- to 16-flowered; peduncles 1.5–3 cm long, pedicels 8–12 mm long, both sparsely pilose or glabrous. Calyx diffusely pilose outside with 5 triangular subobtusate lobes, with often bidentate tips. Corolla pale violet, 17–20 mm across, lobes lanceolate (about 7 mm long and 2.5–3 mm broad), each with pair of green spots at base, puberulent outside only



near apex, margin densely ciliate. Anthers free. Berries oblong, apex obtuse, bright red, up to 1.5 cm long, 0.8–0.9 cm broad, on nearly 1.5 cm long pedicels, slightly thickened above. Seeds 2–2.5 mm long, 1.7–2 mm broad, pale straw-colored, finely reticulate. Flowering from June to August. Fruiting from July.

Along river valleys, in bushy thickets, in damp meadows, along ditches.—*Soviet Far East*: Ussuri (Furugelm Island in Peter the Great Bay), Sakhalin (Sakhalin and Kuril Islands). *General distribution*: Japan (northern region: Hokkaido). Described from Japan. Type in Tokyo?

*Note*. Distinguished from *S. depilatum* Koidz. by the leaf shape, oblong berries, and corolla with narrower lobes and pale color.

10. *S. asiae-mediae* Pojark. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR XVII (1955).—*S. dulcamara* auct. fl. turkest. (non L.): O. Fedtsch. in Izv. Obshch. lyub. estestv., antrop. i etn. CIII (1902) III; O. and B. Fedtsch. Perech. rast. Turkest. 5, 74, p.p.

22 Perennial. Shrub or semishrub with woody rhizomes. Branches long, climbing, sometimes flexuous, finely ribbed, older branches with light brownish yellow longitudinally rugose bark, younger branches herbaceous, glabrous or with sparse fine patent hairs. Leaves up to 9.5 cm long and 6–7 cm broad (sometimes reaching 19 cm in length and breadth), both surfaces light grayish green, young leaves sparsely pubescent with crispate hairs, later glabrescent; most leaves, especially upper ones, cleft up to middle or rarely  $2/3$  near base, forming two small obtuse, rarely subacute, ovate or almost rhomboid, hastate or upward-directed lobes; middle large lobe deltoid-lanceolate, gradually tapering upward with subobtuse or acute apex, base cuneate; trilobed leaves ovate-deltoid with hastate or broadly cuneate base, entire leaves lanceolate or oblong-ovate with cuneate or truncate-rounded base; petioles  $1/3$ – $2/5$  as long as lamina, ribbed, glabrous or slightly hairy along rib margins. Inflorescence terminal and extra-axillary, sometimes leaf-opposed, cymes forming broad corymbose panicle, 3–4 times dichotomously branched in lower part, 30(35–45)-flowered; peduncles 2.5–6 cm long, like pedicels glabrous or with sparse patent hairs. Pedicels 5–12 mm long, slender, slightly thickened above. Calyx 5-lobed with triangular lobes to sinuate-dentate, with fine acute teeth, subglabrous or sparsely appressed hairy. Corolla 14–18 mm across (? bluish) violet, with 5 pairs of green spots near base: lobes lanceolate or ovate-lanceolate, more or less appressed hairy outside on tips, margin with dense white fringe of short cilia. Anthers connate. Fruits globose, 4.5–7 mm in diameter, on slightly thickened pedicels. Seeds reniform, finely reticulate, about 2 mm long and broad. Flowering from June to September. Fruiting from July (Plate I, fig. 2).

In riverine thickets, in ravines, along irrigation canals. *Soviet Central Asia*: Syr Darya, Pamiro-Alai (Alai range and in the south of Kafirnigan up to Darvaz), Tien Shan (Fergana). *General distribution*: Iran (eastern region: Hindu Kush). Described from Fergana (Uzbekistan) around Naiman-Sai in the Kokand region. Type in Leningrad.

*Note.* *S. asiae-mediae* with its lobed leaves is very similar to *S. lyratum* Thunb. (throughout southeast Asia), from which it is distinguished by almost complete absence of pubescence (*S. lyratum* is a rather densely, patently, pubescent plant), connate anthers, larger flowers, smaller fruits, and also more tapering leaves.

Section 3. *Morella* (Din.) Bitter in Hegi, Illustr. Fl. Mittel-Eur. V, 4 (1927) 2583; subsect. *Morella* Dun. in DC. Prodr. XIII, 1 (1852) 28.—Flowers small, stellate, mostly white. Filaments with multicellular hairs below; anthers ellipsoid, dehiscing by two oblique pores, sometimes subsequently transforming into slit. Style pubescent at base. Berries small. Annuals with simple, sinuate-dentate, sinuate, or entire leaves and extra-axillary few-flowered bostryx inflorescences. Pedicels not articulate at base.

Species of this section are widely distributed in tropical, subtropical, and temperate countries of both hemispheres.

Cycle 1. *Nigra* Pojark. Fruit black (very rarely greenish or white). Corolla 2–3 times as long as calyx. Stem and leaves not fetid. Pubescence of simple, eglandular hairs.

Species of this Cycle, apart from temperate zones of Eurasia, are represented also in tropical and subtropical countries mainly of the Old World.

11. *S. nigrum* L. s. str. Sp. pl. (1753) 186 (quoad var.  $\alpha$ . *vulgare*); Gilib. fl. lith. I, 38; M.B. fl. taur.-cauc. I, 165, p.p.; Ldb. fl. Ross. III, 188, p.p.; Schmalh. fl. II, 249, p. min. p. and excl. var.; Grossh. fl. Kavk. III, 355, p.p. and excl. var.; Kryl. fl. Zap. Sib. X, 2407; Kom and Alis. Opred. rast. Dalnevost. kr. II, 915.—*S. nigrum*  $\alpha$ . *vulgare* L. Sp. pl. (1753) 186; Dun. in DC. Prodr. XIII, 1, 50; Syreistsch. III. fl. Mosk. gub. III, 120; Fedtsch. and Fler. fl. Evrop. Ross. 842, p.p.—*S. melanocerasum* auct., non Willd.: Nym. Consp. fl. europ. (1878–1882) 526; Trautv. Increm. fl. ross. III, 571, excl. syn.—*Id.*: Rchb. Ic. bot. tab. CMLIII; Syreistsch. l.c. fig. on p. 120.—*Exs.*: Herb. fl. Ingr. no. 445; fl. pol. exs. No. 853.

Annual. Stem 15–70 cm tall, erect, divaricately branched, glabrous or antrorsely puberulent in upper part, sometimes sparsely puberulent below and on nodes, cylindrical below, compressed cylindrical above, as also branches; branches glabrous or, especially new shoots, sparsely pubescent with indistinct thin smooth (not serrated) ribs. Leaves succulent, somewhat thick (dry ones thin, often chartaceous), glabrous or with sparse



Plate II.

1. *Solanum zelenetskii* Pojark., flower and portion of branch;—2. *S. transcaucasicum* Pojark., flower and portion of branch;—3. *S. woronowii* Pojark., flower and portion of branch.



- antrorse appressed setiform hairs along main ribs, up to 11(13) cm long and 6(8.5) cm broad (mostly 6–7 cm long), lanceolate-ovate or narrowly elliptical-ovate mixed with ovate leaves, gradually tapering from middle to acute tip, or sometimes short-mucronate, base cuneate, or rounded-cuneate, widely decurrent on petiole, partly entire, and partly, usually only in lower half, sinuate-angular or sinuate-dentate, teeth broad, generally 3, rarely 4–5. Inflorescences 3–8 flowered, usually extra-axillary, rarely leaf-
- 26 opposed, umbellate or slightly racemose-corymbose cymes with somewhat regularly spaced (especially in fruit) pedicels; peduncles glabrous or covered with sparse antrorse appressed hairs. Pedicels often densely pubescent, drooping. Calyx glabrous or sparsely appressed hairy with ovate, obtuse, or subacute teeth. Corolla 6–7 cm long, white, 2–3 times as long as calyx, with ovate-lanceolate lobes, puberulent outside. Berry globose, 8–9(10) mm in diameter, black, occasionally green. Flowering from first half of June to October. Fruiting from July.

A weed and ruderal growing in gardens, kitchen gardens, near habitations, roads, hedges, garbage dumps. Sometimes in bushy thickets along river banks.—*European USSR*: Dvina-Pechora (very rarely (Vologda), escape), Baltic States, Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Volga Region Upper Dniester, Bessarabia, Black Sea Region, Crimea (rare), Lower Don, Lower Volga; *Caucasus*: all regions (rare); *Western Siberia*: occasionally Upper Tobol, Irtysh, Altai; *Eastern Siberia*: single occurrence (escape) in Angara-Sayan, Irkutsk; *Soviet Central Asia*: Aral-Caspian (northern section), Balkhash Region, Syr Darya (very rarely—Tashkent oasis), Kara Kum (rarely in oases), mountainous Turkmenia (rarely). *General distribution*: Scandinavia, Central and coastal Atlantic Europe, Mediterranean Region, occasionally in Balkan States-Asia Minor and Iran, more often in the Dzh.-Kashgar and India-Himalayas. Naturalized in some places in North America. Described from Europe. Type in London.

*Note*. Of the species sometimes referred to *S. nigrum* as varieties, the following can be found as escapes in our country.

1. *S. chlorocarpum* (Spenn.) Tausch, Sert. fl. Transsylv. (1853) 52 (*S. nigrum* var. *chlorocarpum* Spenn.)—South European in origin (France, Spain), with yellowish green fruits. It should not be confused with the green-fruited form of *S. nigrum* L., from which it differs by its small sinuate-dentate leaves and angular branches with prominent serrated ribs. The green-fruited form of *S. nigrum* was identified by earlier authors (Reichenbach, Herder) as *S. viridescens* Kostel. (the name, apparently, remains unpublished).

2. *S. humile* Bernh. ex Willd. Enum. pl. hort. Berol. I (1809) 236 (*S. luteo-virens* C.C. Gmel. Fl. bad. Suppl. 1826, 177), was reported by Schmalhauzen from the Ukraine and by Abromeit from the Kaliningrad

Region. It is characterized by widespread, elongated branches; glabrous or subglabrous, with serrated nerves, broad, entire or slightly sinuate leaves; and dull greenish yellow or waxy yellow berries. Described from southern Europe. Reported from almost the whole of Europe.

- 27 *Economic importance.* The fruit of *S. nigrum* is used in food (especially in the Urals and Siberia), mainly for stuffing pies and jam, since the raw berries usually have an unpleasant flavor. The belief has gained ground in Europe that the berries of this plant can cause poisoning and the green parts are poisonous for cattle. These notions, obviously, are wrong or exaggerated and, perhaps, are true for other similar races. Ripe berries of the black-fruited *Solanum* of Central Europe contain a negligible quantity of a poisonous glucoalkaloid (it is not possible to establish to which geographical race the data are related), while unripe berries and green parts contain a little more of it. Apart from solanine, the alkaloids betamin and saponin are present. Another new alkaloid has been discovered in the leaves, one which is not yet identified. The tannin content in green parts is 7–10% and in the roots 4.5–6%.

12. *S. decipiens* Opiz in Bercht. u. Opiz, Oekonom.-techn. Fl. Bohem. III, 2 (1841) XXIV; Dun. in DC. Prodr. XIII, 1, 51.—*S. nigrum* auct. fl. ross. cauc. p.p. non L.: Ldb. Fl. Ross. III, 189; Schmalh. Fl. II, 249; Grossh. Fl. Kavk. III, 355; Oprod. Rast. Kavk. 298.—? *S. schultesii* Opiz, l.c.

Annual. Stem 20–80 cm tall, usually branched, slightly angular; together with petioles, peduncles and pedicels, somewhat densely villous with short, soft, antrorsely patent hairs (usually mixed with a few long hairs). Branches 4-angled, with smooth (not serrated) nerves at angles. Leaves diffusely or somewhat densely puberulent underneath, upper surface with longer hairs thickened at base, often subsequently glabrescent, smaller than in *S. nigrum* (on branches rarely more than 5–6 cm long), ovate or obovate, sometimes rhomboid-ovate, acuminate or mucronate with bent mucro, base cuneate, sometimes slightly oblique, narrowly decurrent along petiole, sinuate-dentate (with 3–6, rarely 7 teeth on each side), sometimes mixed with sinuate leaves; petiole  $(1/4)1/3$ – $1/2(2/3)$  as long as lamina. Pedicels drooping, usually regularly spaced, in flowers slightly and in fruits more distinctly (at 1.5–2.5 mm), almost equal in length; bostryx therefore almost racemose during fruiting; flowers 4–8 in number. Calyx diffusely appressed hairy, with deltoid or ovate-deltoid, acute, or obtuse teeth. Corolla white, 6–7 mm long, about 2.5 times length of calyx, on outside diffusely or only along margin of lobes densely covered with very fine appressed hairs; lobes oblong-ovate, acuminate. Anthers yellow. Berry black, globose, 6–8 mm in diameter. Flowering from first half of June to November. Fruiting from July.



Weed in gardens and kitchen gardens, on garbage dumps, near roads, sometimes along forest edges and in ravines along river banks.—*European USSR*: Upper Dnieper, Middle Dnieper, Upper Dniester, Bessarabia, Black Sea Region, Crimea (rarely), Lower Don (southern parts); *Caucasus*: Ciscaucasia, western Transcaucasia, Dagestan. *General distribution*: Scandinavia (southwestern region, rarely), Central Europe (common). Atlantic Europe (rarely), Balkan States-Asia Minor (eastern Lazistan) Armenia-Kurdistan (Artvin Dist.). Described from Czechoslovakia. Type in Prague.

*Note*: 1. *S. decipiens* Opiz is a common and widely distributed weed of the steppe and forest-steppe regions of Central Europe (Hungary, Czechoslovakia), southern regions of the European USSR and Caucasus. This species, apparently, hardly reaches the Don, further east of which it has not been found so far. European authors who distinguish this species sometimes name it *S. nigrum* var. *schultesii* (Opiz) Rouy (as distinct from the present *S. nigrum* L., which is separated as *S. nigrum* var. *vulgare* L. or var. *genuinum* Döll.), thus identifying *S. decipiens* with *S. schultesii* Opiz (described from Czechoslovakia). The latter species, evidently, should be combined with *S. decipiens* Opiz, from which Opiz distinguished it by longer pubescence and some external resemblance to *S. villosum* Lam. (i.e. with *S. luteum* Mill.), obviously due to leaves with broader lobes. We preferred the neglected name *S. decipiens* Opiz, since a large majority of our, as well as Central European, specimens have short pubescence and leaves with narrower, longer lobes and hence the identification with this species is more appropriate. However, specimens are available from the Ukraine and Caucasus with longer pubescence and more broadly lobed leaves. Moreover, both these characteristics are found to be unrelated to each other.

2. *S. decipiens* Opiz is well distinguished from *S. nigrum* L. by its pubescent stems, petioles, inflorescence axis, leaf form, and also by the structure of the bostryx, always with regularly spaced pedicels.

*Economic importance*. The berries are used by the population as food in raw form and also for jam and stuffing for pies.

13. *S. judaicum* Bess. Prim. fl. Galic. austr. I (1809) 183; Schult. Oesterr. Fl. I, 393; Roem. and Schult. Syst. veg. IV, 589; Dun. in DC. Prodr. XIII, 1, 53.

Annual. Stem cylindrical, glabrous, except sparsely antrorsely hairy nodes, profusely branched; branches diverging at acute angle, 4-angled, ribbed, ribs serrated, i.e. forming acute, uncurved outgrowths ending in rather long bristle; angles at first sparsely puberulent with antrorsely appressed hairs, later glabrescent. Leaves in herbarium chartaceous, glabrous or with solitary hairs, margin sparsely setose, large (on branches up to 9 cm long and 7 cm broad), ovate, with broadly cuneate, usually

29 somewhat oblique base, widely decurrent, often up to very base of petiole, tapering rather sharply toward tip and drawn into short, often bent, mucro, sinuate-angular or broadly sinuate-dentate usually in middle; petiole  $1/5-1/3$  as long as lamina. Inflorescence 6–8-flowered, extra-axillary, on short (1–1.5 cm long, and in fruits up to 2 cm long) peduncles, bostryx corymbose with somewhat regularly spaced, distichous pedicels, pendant along both sides of peduncle. Pedicels and calyx diffusely, and peduncles rather densely covered with short antrorse setiform hairs. Calyx teeth triangular, subacute. Corolla white, 3–3.5 times as long as calyx, sparsely puberulent on outside. Anthers yellow. Berries 6.5–9 mm long, globose, black. Flowering and fruiting toward end of July (Plate III, fig. 1).

Near roads, on dunghills.—*European USSR*: Upper Dnieper. Endemic? Described from western Galicia. Type in Kiev, isotype in Leningrad.

*Note.* The species was observed only once and hence it is not clear whether it is a local race or an escape. In the absence of material from the Near East, it was not possible to verify if *S. judaicum* Bess. is the same as *S. nigrum* var. *judaicum* L., which has also been reported to have branches serrated along the ribs and broadly sinuate leaves. In "Flora of Syria, Palestine and Sinai" by Post, they are acknowledged as synonyms.

Series 1. *Transcaucasica* Pojark.—Corolla up to 6–7 mm long, nearly 3 times as long as calyx. Berries globose, yellow, or only raw ones yellow (or orange), turning brownish or reddish brown on ripening. All peduncles (or except terminal) distinctly longer than pedicels. Branches with narrow, smooth, or serrated ribs. Pubescence of simple hairs, sometimes mixed with sessile, very minute glands.

In addition to our two species, *S. ochroleucum* Bast. (of southern Europe) and *S. flavum* Schult. (described from Hungary) should be included in this series.

14. *S. transcausicum* Pojark. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR XVII (1955).—*S. flavum* auct. fl. cauc. (non Kit. ex Schult.): Hohenack. in Bull. Soc. Nat. Mosc. VI (1833) 220; Ldb. Fl. Ross. III, 189 (excl. syn. No. 2).—*S. nigrum* var. *flavum* Hohenack. in Bull. Soc. Nat. Mosc. XI, 3 (1838) 36.—*S. nigrum* var. *xanthocarpum* auct. (non Koenen): Grossh. Fl. Kavk. III (1932) 356.

30 Annual. Stem branched, 15–80 cm tall, sparsely covered with short antrorse hairs, lower part cylindrical, smooth; upper, along with branches, 4-angled, with distinct ribs along angles, mostly forming fine, sharp outgrowths, each ending in antrorse bristly hair. Leaves subglabrous or mostly sparsely puberulent on young shoots, lighter underneath, in herbarium thin and chartaceous, on stem up to 7.5 cm long and 4 cm broad, on branches 2–5.5 cm long and 0.8–3.6 cm broad, narrowly ovate-elliptical, some or

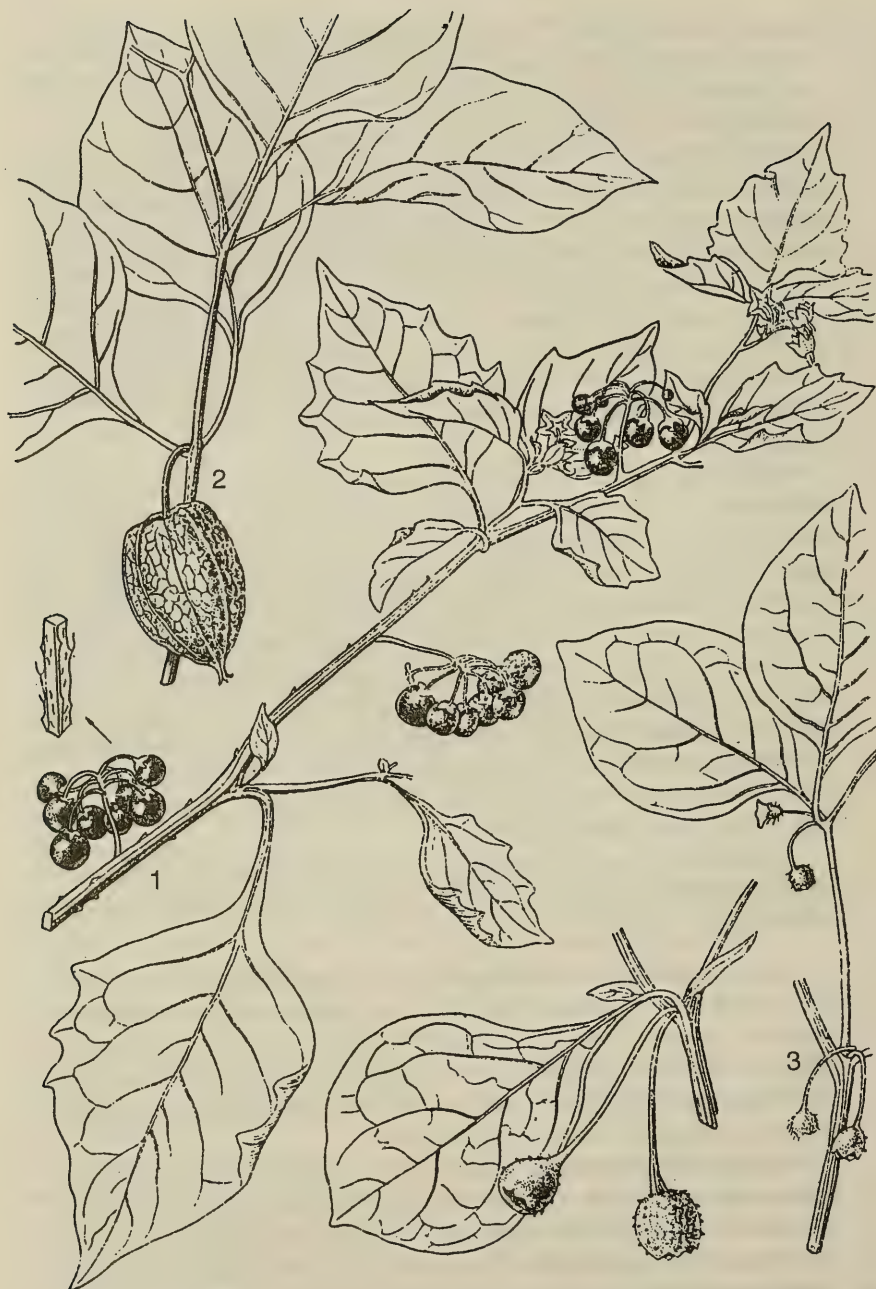


Plate III.

1. *Solanum judaicum* Bess., portion of plant and section of branch;—2. *Physalis praetermissa* Pojark.;—3. *Physalisstrum echinatum* (Yatabe) Makino.



often all lanceolate on branches, usually gradually and narrowly tapering from base toward apex, with cuneate, mostly symmetrical decurrent base; margin above base incised with (2)3–5 rather large teeth on each side. Inflorescence (2)3–6-flowered, usually umbellate, rarely with somewhat spaced pedicels (racemose); peduncles 0.8–2.3 cm long, lower ones usually longer than upper and in fruit distinctly, up to 2(3) times as long as pedicels, upper ones sometimes as long as pedicels; both sparsely appressed hairy. Calyx with sparse appressed hairs, cleft up to middle with obtuse ligulate lobes. Corolla white, 4.5–6 mm long, nearly three times as long as calyx, lobes finely ciliate along margin and outside near tip. Berries globose, 5–8 mm long, as reported by collectors, yellow. Flowering from June to October. Fruiting from July (Plate II, fig. 2).

In bushy undergrowths, near roads, melon fields, gardens. *Caucasus*: eastern and southern Transcaucasia, Dagestan, Talysh. *General distribution*: Iran (northeastern region). Described from Talysh, from environs of Tatunya in Zuvant. Type in Leningrad.

*Note*. For a long time this species has attracted the attention of Caucasian botanists, who, while trying to determine its specific status, identified it with various yellow-fruited European species (*E. flavum* Kit., *S. ochroleucum* Bast., and even *S. humile* Bernh.). *S. transcausicum* actually is similar to the first two species, from which it is distinguished by narrow leaves and branches with distinct serrated ribs, and from *S. flavum*, by fruits not browning on ripening as well as a different type of pubescence (of setaceous, but not fine, soft hairs).

15. *S. olgae* Pojark. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR XVII (1955).—*S. flavum* auct. fl. turkest. in sched. non Kit. ex Schult.—*S. nigrum* var. *flavum* auct. (non Hohenack., 1838): O. and B. Fedtsch. Perech. rast. Turkest. 5 (1913) 75, p.p. and excl. syn.—*S. nigrum* var. *villosum* auct. fl. turkest.: O. and B. Fedtsch. l.c. 75, p.p. and excl. syn.—*S. nigrum* auct. fl. turkest. p. max. p.: Fedtsch. Rast. Turkest. (1915) 685.

Annual. Stem erect, 15–80 cm tall, 8 mm in diameter, usually profusely branched (simple only in weak plants), often flexuous, lower part cylindrical, puberulent, sometimes glabrescent with age, upper part 4-angled; branches (also petioles, peduncles, and pedicels) somewhat densely pubescent with antrorse, somewhat patent, rigid short hairs, sometimes very densely covered with very minute (seen under a powerful  
31 magnifying glass!) sessile capitate glands, forming a yellowish bloom, 4-angled, with thin distinct serrated ribs usually forming rather numerous, sharp outgrowths. Leaves light, glaucescent green, somewhat thick in dry condition, young leaves densely covered on both surfaces with short, antrorse, somewhat appressed hairs, sometimes mixed with minute sessile glands, later sometimes glabrescent except for veins; veins distinct on

both surfaces, thicker beneath; cauline leaves up to 7(10) cm long and 5(7) cm broad, usually 1.5–5 cm long and 1.2–3.5 cm broad on branches, mostly elliptical, rarely elliptical- or almost rhomboid-ovate (upper leaves on branches often oblong-ovate), tapering into acute or subobtusate tip, with cuneate entire base, decurrent almost up to base of petiole, margin sinuate-dentate or sinuate, with 2–4 subobtusate or acute teeth on each side, sometimes mixed with sinuate-angular or entire leaves; petioles in cauline leaves often almost equalling lamina, on branches  $(1/4)1/3-2/3$  as long as lamina. Peduncles extra-axillary, 1–2.5 cm long, lower ones always longer (up to twice) length of pedicels, upper sometimes as long or a little shorter than lower pedicels. Bostryx 6–10(12)-flowered, with spaced pedicels, especially in fruit and appearing corymbose, sometimes formed at tip. Pedicels in flowers 0.5–0.7 cm long, 8–12 mm in fruit, nodding. Calyx sparsely setose and densely covered with sessile glands, with ovate or oblong, subacute or obtuse lobes. Corolla white, 4.5–5.5 mm long, 2.5–3 times length of calyx, with deltoid-ovate lobes, usually slightly glandular and sparsely pubescent outside, margin densely ciliate. Anthers yellow. Berry globose, 7–10 mm in diameter, fresh berry orange-yellow, brownish red on ripening, dark brownish red when dry. Flowering from June to October. Fruiting from July, up to late autumn (Plate I, Fig. 3).

Weed in fields, gardens and kitchen gardens, fallow land (in regions with irrigated farming, only in irrigated land). Frequent. In the south of Soviet Central Asia it is found on rocky slopes, precipices, and river banks (primary habitat ?). *Soviet Central Asia*: Dzh.-Tarbagatai, Kyzyl Kum (in oases), Kara Kum (in oases), mountainous Turkmenia, Amu Darya, Syr Darya, Pamiro-Alai (except eastern Pamir), Tien Shan (introduced in the eastern region). *General distribution*: Iran. (Afghanistan), Dzh.-Kashgar. Described from Tadzhikistan from the environs of kishlak (village) Kshtut in Leninabad region. Type in Leningrad.

*Note.* *S. olgae* most closely resembles *S. flavum* Kit. ex. Schult. (Oesterr. Fl. I, 1814, 394), described from Hungary. Fruits of this species are yellow at first, later turning darker, becoming dark brown. Our earlier botanists (O. Fedtschenko, Regel) have determined the specimens of this Soviet Central Asian species as *S. flavum* Kit. However, morphologically, *S. flavum* has little in common with *S. olgae*; it is described as having narrow lanceolate-ovate, deeply sinuate-dentate leaves and few-flowered inflorescences.

- 32     Cycle 2. *Alata* Pojark.—Corolla (5–6)7–9 mm long, 3–5 times as long as calyx. Fruits orange- or vermilion-red. Pedicels equalling or a little longer than peduncles. Branches with distinct ribs (sometimes almost alate), sharply verrucose; pubescence of simple hairs, usually setose on ribs. Leaves and stems not fetid.



This series (cycle) includes the following three species.

16. *S. zelenetskii* Pojark. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR XVII (1955).—*S. nigrum*  $\beta$ . *villosum* auct., non Willd.: M.B. Fl. taur.-cauc. (1808) 165; III, 159, p.p. quoad pl. taur.—*S. villosum* auct., non Lam.: Stev. Verz. Pflanz. Taur. (1857) 262.—*S. miniatum* auct. fl. taur. non Willd.: Stev. in sched.; Golde in Sched.—*S. miniatum*  $\beta$ . *glabriusculum* Zelenetz. Mat. Fl. Kryma (1906) 331.

Annual. Stem up to 50 cm tall, slightly flexuous, at first somewhat pilose, later glabrescent, lower part as well as branches hard, woody, compressed cylindrical, with thin but prominent ribs; branches slender, 4-angled, with ribs more prominent than one stem and more serrate due to sharp tuberculate outgrowths ending in upcurved bristles; angles at first rather densely, and later sparsely, covered with antrorse, appressed, short setose hairs. Leaves small, cauline, usually not more than 6 cm long and 3.5 cm broad, on branches 1–4.5(5) cm long and 0.7–2.5(3.5) cm broad; on leaves with both surfaces appressed-setose hairy, mature leaves subglabrous, sparsely setose-celiolate only on veins and along margin, deltoid-ovate, often narrow, upper leaves mostly lanceolate, gradually tapering into rather broad acute tip, sometimes a few leaves shortly mucronate, with cuneate base, decurrent on upper part of petiole, partly entire, partly with 1–2 small acute teeth in lower portion separated by obtuse sinuses, sometimes individual leaves sinuate-dentate with 3–4 teeth, often major part of leaves entire; petioles with entrorse appressed hairs, in cauline leaves  $2/5$ – $2/3$  as long as lamina, shorter on leaves on branches. Peduncles extra-axillary, short, 7–12 mm long in fruit, mostly shorter than deflexed pedicels; both somewhat densely covered with antrorse appressed hairs. Inflorescence umbellate, (2)3–5-flowered. Calyx sparsely appressed setose, with ablong lobes. Corolla white, 7.5–9 mm long, 3.5–4(5) times as long as calyx, subglabrous outside, with lanceolate acuminate ciliate lobes. Anthers yellow. Berry globose, up to 8–9 mm in diameter, light (? orange) red. Seeds about 2 mm long, 1.75 mm broad. Flowering from June. Fruiting from July, up to late autumn (Plate II, Fig. 1).

- 33 On shale and rocky slopes, coastal cliffs, near hedges and roads, and as weed in gardens, kitchen gardens, in vineyards. Frequent.—*European USSR*: Crimea (mainly southern and eastern regions). Endemic. Described from Oreanda (vicinity of Yalta). Type in Leningrad.

*Note.* Closely resembles the Mediterranean *S. alatum* Moench. The latter is easily distinguished from the Crimean species (apart from slightly different color of fruits ?) by broad, elliptical-ovate leaves, coarsely and broadly sinuate-dentate almost from apex, apical leaves tapering more sharply, more densely pubescent, and with smaller and finer hairs

which, like pubescence of stem and branches, persist, usually until end of vegetative phase.

\**S. alatum* Moench, Meth. Pl. (1794) 474.—*S. rubrum* Gilib. Fl. lith. I (1781) 38, non L.—*S. miniatum* Bernh. ex Willd. Enum. Pl. hort. Berol. (1809) 236; Bess. Enum. pl. Volh. 11; Ldb. Fl. Ross. III, 189; Dun. in DC Prodr. XIII, 1, 56.—*S. puniceum* C.C. Gmel. Fl. bad. IV (1826) 176 (nom. abort.).—*S. nigrum* var. *miniatum* Mert. and Koch, Deutsch. Fl. 2 (1826) 231; Schmalh. Fl. II, 249; Fedtsch. and Fler. Fl. Evrop. Ross. 842.—*S. villosum* var. *alatum* Marz. in Hegi, Illustr. Fl. Mittel-Eur. V, 4 (1927) 2594.—Ic. Rchb. Ic. bot. tab. CMXCVI; Ic. fl. Germ. XX, tab. MDCXXXII, f. 3–4; Javorka, Iconogr. fl. Hung. f. 3223.—*Exs.*: Fries, Herb. norm. No. 21; Fl. gall. and germ. exs. No. 705.

- Annual. Stem 10–40 cm tall, branched; branches slender, stem as well as branches 4-angled, almost alate due to prominent ribs with unequal sharp outgrowths, generally ending in upcurved seta and somewhat densely covered with rigid antrorse hairs. Leaves ovate, elliptical or rhombic-ovate, with cuneate, often oblique decurrent base, rather sharply tapering upward with acute tip, coarsely sinuate-dentate (with 3–5 teeth on each side), often mixed with slightly sinuate or entire leaves, young leaves densely pilose, sparsely so with age with minute patent hairs; cauline leaves up to 6 cm long and 3.5 cm broad, 1.2–2 cm long and 0.8–1.5 cm broad on branches; petioles winged, usually densely hirtellous,  $(1/3)1/2$ – $2/3$  as long as lamina. Cymes extra-axillary 3–4(5)-flowered, umbellate or somewhat racemose, pedicels somewhat spaced, slender in flowers, thicker in fruit, 6–10 mm long; peduncles short, 6–10 mm long, usually equaling or shorter than pedicels in fruit; both densely covered with somewhat rigid crispate hairs.
- 34 Calyx cleft into ablong-deltoid or almost linear obtuse lobes. Corolla white, 3–5 times as long as calyx, with lanceolate-deltoid lobes tomentose-pilose along margin and on tip outside. Anthers yellow, connivent. Berry small, 6–8(9) mm in diameter, globose, vermilion-red. Seeds 2–2.3 mm long, 1.7–2 mm broad. Flowering from May to October. Fruiting from second half of June.

Occasionally as weed in gardens, kitchen gardens, roadsides; escape.—*European USSR*: Upper Dnieper, Middle Dnieper, Crimea, Bessarabia, Black Sea Region; Caucasus: reported from western and eastern Transcaucasia, but apparently incorrectly. *General distribution*: Central Europe, Mediterranean Region, Balkan States-Asia Minor. Described on basis of specimen from Berlin Botanical Garden. Type in Berlin.

17. *S. woronowii* Pojark. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR XVII (1955).—*S. villosum* var. *alatum* auct. fl. cauc. (non Marz.): Grossh. Fl. Kavk. III (1932) 356 (excl. syn.).

Annual. Profusely branched plant, 25–120 cm tall. Stem up to 0.8 cm thick in lower part, later becoming woody, cylindrical, smooth or with very thin ribs; branches (as well as upper part of stem) somewhat 4-angled, with broader ribs forming rather fine sharp outgrowths, glabrous or covered with sparse, antrorse short hairs. Leaves yellowish green on both surfaces, succulent but not thick, mostly chartaceous when dry, young leaves sparsely hairy on both surfaces, glabrescent with age, only midrib thick and lateral veins thin, 2–7 cm long and 1.6–5.5 cm broad in branches, ovate (only upper leaves of branches sometimes elliptical), with broad cuneate or somewhat rounded, sometimes slightly oblique base, tip short-acuminate, sometimes with short mucro, usually entire, only a few in lower part with one or two broad teeth on one or both sides. Inflorescences umbellate, 2–4-flowered; peduncles short, 5–10 mm long, shorter than pedicels or somewhat equaling them in fruit; both covered with antrorse appressed hairs. Calyx deeply cleft into oblong lobes, sparsely appressed hairy outside. Corolla 6.5–7.5 mm long, 3.5–5 times length of calyx, with lanceolate-ovate lobes, glabrous outside, except densely puberulent tip and margin of limb. Berries globose, 7–9 mm in diameter; raw berries ocher yellow, ripe ones dull orange-red, somewhat sweet, with an unpleasant flavor. Seeds yellowish, reniform-ovate, 1.8–2 mm long, 1.4–1.5 mm broad. Flowering from June to November. Fruiting from July (Plate II, Fig. 3).

On coastal cliffs and along roadsides—*Caucasus*: Western Transcaucasia (Imeretia, Abkhazia, Adzharia). *General distribution*: Balkan States-Asia Minor (Lazistan). Described from vicinity of Gagry in Abkhazia. Type in Leningrad.

- 35 Series 2. *Pseudoflava* Pojark.—Corolla 4–5 times as long as calyx, up to 9.5 mm long. Ripe fruit reddish brown or dark brown. Peduncles, at least lower ones, longer than pedicels. Leaves entire (only solitary leaves with one lobe at base on one or both sides), branches without distinct ribs; pubescence of thin and fine hairs.

In addition to our species, *S. kitaibelii* Schult. belongs to this series.

18. *S. Pseudoflavum* Pojark. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR XVII (1955).—*S. flavum* auct. fl. turkest. (non Kit. ex Schult.): O. Fedtsch. in Izv. Obshch. lyub. estestv., antrop. ietn., CIII (1902) III.—*S. nigrum* var. *flavum* auct. (non Hohenack.): O. and B. Fedtsch. Perech. rast. Turkest. 5 (1913) 75, p.p. and excl. syn.

Annual. Plant branched, reaching apparently 1.5 m in height. Stem in lower part cylindrical, smooth, without ribs, usually glabrous; branches subcylindrical or 4-angled, with very thin ribs, partly smooth or slightly asperate, with a few small outgrowths. Leaves on branches up to 8 cm long and 5 cm broad, ovate or elliptical-ovate, often asymmetrical with cuneate, rarely rounded-cuneate, often extremely oblique, decurrent base,



rather gradually tapering toward tip, entire, only a few leaves with single tooth above base on one or both sides, light, bluish green, mature leaves finely puberulent only among main ribs, elsewhere glabrous. Inflorescences extra-axillary, 4–8-flowered, racemose, pedicels regularly spaced (especially at fruiting time); peduncles in fruit 1–2.5 cm long, lower ones usually distinctly (often up to twice) as long as pedicels, equaling them only in terminal inflorescences on branches. Calyx cleft up to middle into ovate subacute lobes. Corolla 7–9.5 mm long, 4–5 times as long as calyx. Unripe berry yellow, ripe berry apparently reddish brown. Flowering from June to October. Fruiting from July.

In gardens, kitchen gardens, along irrigation canals, near road, rare.—*Soviet Central Asia*: Kara Kum, Syr Darya, Pamiro-Alai (northern region), Tien Shan (northern region). *General distribution*: Iran (north). Described from Alma-Ata Region. Type in Leningrad.

*Note*. This plant is apparently rare in Soviet Central Asia: it is represented in the herbarium of the Botanical Institute of the Akad. Nauk SSSR by single collections from isolated localities (vicinity of Alma-Ata, Frunze, Tashkent, Margelan, Jambul Region, Zeravshan valley, etc.) and does not give the impression of being a native plant. It possibly originated in Iran, where it was discovered in the Caspian Region. Very similar to *S. kitaibelii* Schult., which is distinguished by brown berries, tomentose branches, and rather dense (up to tomentose) pubescence of leaves, *S. kitaibelii* is a species of uncertain origin. It is described from Hungary, but later authors do not refer to it. It is known for over 100 years in cultivation, often under the incorrect name '*S. flavum* Kit.'. In 1835, it was cultivated in the St. Petersburg Botanical Garden.

- 36 Series 3. *Lutea* Pojark.—Ripe fruit yellow. Corolla 4–5 times as long as calyx. Pubescence of simple and glandular patent hairs. Stems cylindrical without distinct ribs. Plant fetid.

\**S. luteum* Mill. Gard. Dict. ed. VIII (1768) No. 3; Gilib. Fl. lith. I, 38.—*S. nigrum* γ. *villosum* L. Sp. pl. (1753) 186; Schmalh. Fl. II, 249.—*S. villosum* Lam. Tabl. encycl. II (1798) 18; Encycl. méth. IV, 289; Ldb. Fl. Ross. III, 189; Boiss. Fl. or. IV, 285; Grossh. Fl. Kavk, III, 356; Opred. rast. Kavk. 298, non Mill.—*lc.*: Hegi, Illustr. Fl. Mittel-Eur. V, 4, f. 3416, a–f; Bonnier, Fl. compl. Fr. Suisse, Belg. VIII, tab. 431, f. 2019c; Javorka, Iconogr. fl. Hung. f. 3224.—*Exs.*: Fl. Palaest. exs. No. 284 (sub *S. nigro*).

Annual. Plant fetid. Stem 10–50 cm tall, simple or branched; branches cylindrical with slightly marked nerves, without papillose excrescences, densely pubescent with patent, crispate, partly glandular, viscid hairs, sometimes tomentose-villous. Leaves bright green (when dry, yellowish green), thin, densely covered on both surfaces with rigid patent hairs

thickened at base, usually longer on veins and along margin; cauline leaves 2–6 cm long and 1.5–3.5 cm broad, mostly ovate or broadly ovate, rarely rhombic-ovate, with rounded or rounded-cuneate, rarely narrowly cuneate base decurrent on petiole, short-acuminate, sometimes obtuse, with angular, sinuate-dentate or partly entire margins; petioles patently villous or tomentose-villous  $(1/3)1/2-2/3$  as long as lamina. Flowers 3–5(8) in umbellate cymes; peduncles extra-axillary, 5–20 mm long, often shorter than drooping pedicels in fruit; both patently villous or tomentose-villous. Calyx with linear oblong or deltoid-ovate lobes, tomentose-villous,  $1/4-2/7$  as long as corolla. Corolla white, 8–10(11) mm long, cleft into lanceolate-triangular lobes, villous on outside and along margin. Anthers yellow. Berry slightly elongated, globose-obovoid, light yellow to saffron yellow, up to 10 mm in diameter (generally 7–8 mm). Seeds 1.5–1.8 mm long, 1.2–1.3 mm broad, white. Flowering from June to October. Fruiting from July.

39 A weed and ruderal plant, in the USSR rather rare, introduced and propagating in gardens.—*European USSR*: Baltic Region, Upper Dnieper, Middle Dnieper, Upper Dniester, Bessarabia, Black Sea Region, Crimea; *Caucasus*: western Ciscaucasia, western and eastern Transcaucasia. *General distribution*: Central Europe, Mediterranean Region, Balkan States-Asia Minor. Described from a cultivated specimen.

*Economic importance*. Fruits of this species are sourish, rather pleasant in taste, used for jam, and fresh.

Subgenus II. *LEPTOSTEMONUM* Dun. in DC. Prodr. XIII, 1 (1852) 29.—Subgen. *Leptostomum* Bitter in Hegi, Illustr. Fl. Mittel-Eur. V, 4 (1927) 2584.—Anthers narrow, sublinear tapering toward tip, dehiscing by small lateral openings or rarely along entire length. Inflorescences extra-axillary. Plant of diverse habit; herbs, shrubs or trees, usually covered with stellate hairs and armed.

Section 1. *Melongena* Dun. in DC. Prodr. XIII, 1 (1852) 31, 350.—Sect. *Andromonoecum* Bitter in Hegi, Illustr. Fl. Mittel-Eur. V, 4 (1927) 2585.—*Melongena* Mill. Gard Dict. ed. VIII (1768).—Flowers bisexual and staminate with reduced ovary and short style. Inflorescence few-flowered, often single-flowered; only lowermost flower in inflorescence bisexual, fruit-bearing, often with pedicel deflexed from stem next to elongated peduncle bearing sterile flowers. Calyx and corolla usually 5(6–8)-partite, with very short tube. Calyx accrescent in fruit. Herbs or often shrubs, armed or not, pubescent with stellate hairs. Leaves pinnatifid or partite.

Plant of the tropics and subtropics of both hemispheres.

\**S. melongena* L. Sp. pl. (1753) 186; Ldb. Fl. Ross. III, 1. 189; Schmalh. Fl. II, 250; Grossh. Fl. Kavk. III, 355; Vznachn. rosl. UkrSSR,



370; Kom. in Tr. Gl. bot. sada, XXXIX, 1, 105.—*S. esculentum* Dun. Hist. d. Solan. (1813) 208; in DC. Prodr. XIII, 1, 355.—*Id.*: Dun. Hist. d. Solan. tab. 3; Syreistsch. Ill. fl. Mosk. gub. III, 119; Alpatov, Pertsy i baklazi. figs. 11–17. Eggplant.

Perennial, cultivated as annual. Stem 30–70 cm tall, fleshy, green or slightly violet to dark mauve, rather densely stellate-pubescent, branched. Lower leaves 7–15 cm long, 3–10 cm broad, alternate; upper leaves smaller, often opposite, ovate, with truncate or cuneate extremely oblique base, from slightly angular or sinuate to shallowly incised or almost lobed, with a few broad, usually obtuse lobes, upper surface green, sparsely stellate-pubescent, grayish pubescent to tomentose underneath with 3–4 pairs of prominent veins, usually colored with anthocyanin; petioles almost equaling lamina in lower leaves,  $1/4$ – $1/3$  as long as lamina in upper leaves. Flowers often solitary, but sometimes in 2–3(5)-flowered racemose cymes with pedicel of lower bisexual flower mostly appearing deflexed independently from stem (due to accretion of lower part of peduncle with stem) in direct proximity of peduncle bearing 2–3 sterile staminate flowers at apex; peduncle, pedicels, and calyx grayish due to stellate pubescence; in bisexual flowers pedicel becoming woody, drooping after flowering. Calyx prickly outside, cleft into 5–8(9) unequal, narrow, acuminate lobes. Corolla light to dark violet, with yellow stellately arranged stripes inside, plicate, with very short tube and broad limb 3–4 cm across; cleft into 5–8(9) broad, triangular lobes, covered with short, soft indumentum. Stamens alternating with corolla lobes, half as long as corolla. Style tomentose near base, in bisexual flower longer than stamens, bent; in staminate flowers shorter than stamens, erect; stigma 4–5-lobed. Berry large, 5–20 cm and more in length, 5–10 cm in diameter, ovoid-oblong to narrowly cylindrical, obtuse, indented at base, mostly purple when mature for harvesting (at complete seed-maturity stage becoming lighter, even yellowish), rarely red or whitish, with thick whitish pulp. Seeds 2–4 mm long, yellowish white, flat. Flowering from June to July. Fruiting from July.

Cultivated in fields and kitchen gardens.—*European USSR*: Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Volga Region, Upper Dniester, Bessarabia, Black Sea Region, Lower Don, Lower Volga, Crimea; *Caucasus*: all regions; *Soviet Far East*: Ussuri; *Soviet Central Asia*: all regions. *General distribution*: widely cultivated all over the world in countries with warm and hot climates. Origin not known, assumed to be from the India-Himalayas. Obviously described from a cultivated specimen of Asiatic origin. Type in London.

*Economic importance*. In the southern regions of the USSR, especially in Caucasus and in Soviet Central Asia, eggplants are one of the main vegetable crops. Immature fruits are used in processed form as food. Fresh fruits are used in various preparations (casserole, or 'eggplant caviar',

saucers or stuffed, stewed, roasted). They are also preserved in the dried and pickled form. Eggplants are used by canneries, where they are made into various preserves. The fruits contain 7–11% of dry matter, 3–4% sugar (mainly glucose) and many beneficial phosphorus, calcium, and iron salts. The vitamin content is low, with the exception of B<sub>2</sub> and PP (Alpat'ev, 1953). According to Verner, the fruits contain 92–94% water, 0.76–1.5% nitrogenous substances, 0.06–0.13% fat, 3–4.5% nonprotein nitrogen, 0.9–1.4% cellulose, and 0.4–0.7% ash.

- Section 2. *Androceras* Bitter in Hegi, Illustr. Fl. Mittel-Eur. V, 4 (1927) 2585.—*Androcera* Nutt. Gen. Am. I (1818) 129. —*Solanum Scryptocarpum* Dun. in DC. Prodr. XIII, 1 (1852) 30, p. max. p.—*Solanum* sect. 41 *Nycterium* Wettst. in Engl. u. Pr. Pflanzenfam. IV, 3b (1895) 24.—Corolla somewhat zygomorphic, with two lower lobes larger than other three. Anthers narrow, four almost equal and lower one much longer and curved. Calyx tube accrescent in fruit, closely surrounding enclosed berry until complete ripeness, then drying up inside and releasing seeds by irregular dehiscence. Annual herb, armed and covered with stellate hairs often mixed with simple or glandular hairs. Leaves once or twice pinnatisect.

Species of tropical and subtropical countries of both hemispheres; one of them can be found as far as North America.

\**S. rostratum* Dun. Hist. d. Solan. (1813) 234; in DC. Prodr. XIII, 1 (1852) 329; Fedtsch. and Fler. Fl. Evrop. Ross. 842; Grossh. Fl. Kavk. III, 355; Vznachn. rosl. UkrSSR, 370.—*Androcera lobata* Nutt. Gen. Am. I (1818) 129.—*A. rostrata* Rydb. in Bull. Torr. Bot. Club. 33 (1906) 150.—*Id.*: Dun. (1813) tab. 24; Gleas. New Britt. and Brown Fl. Northeast. Un. St. III, f. in pag. 200.

Annual. Stem up to 60 cm tall, divaricately branched, green, densely covered, along with branches, petioles, peduncles, and pedicels, by fine stellate hairs and with frequent yellow needlelike prickles of dissimilar length. Leaves stellate-pubescent on both surfaces and with needlelike prickles along midrib and lateral veins, ovate to oblong, up to 7–10 cm long, once, but often twice, deeply, often sinuately, pinnatipartite or pinnatisect; lobes or segments obovate to oblong, obtuse, slightly toothed in smaller leaves, in larger leaves lobed or parted. Flowers 3–5(8) on short, 7–10 mm long pedicels, at first crowded at end of short, 2–3 cm long peduncle, later spaced due to elongation of latter forming raceme. Calyx stellate pubescent, tube densely covered with yellowish needlelike prickles, lobes ovate-lanceolate, acuminate, accrescent in fruit, up to 1.5–5(3) cm across, subglobose, completely enclosing berry. Corolla yellow, 2–3 cm across, with lanceolate-ovate lobes. Anthers yellow, 4 subequal, 5th much longer and curved. Style longer than stamens, curved. Flowering from June to October.

Escape. Observed in the following regions.—*European USSR*: Middle Dnieper, Black Sea Region, Crimea, Lower Volga; *Caucasus*: western, eastern and southern Transcaucasia. *General distribution*: Central (Mexico) and North America (Midwest). Described from a cultivated plant from Montpellier. Type in Montpellier.

- 42 *Note*. 1. In the Ukraine (Podoliya) and in the Crimea (near Eupatoria), *S. heterodoxum* Dun. (*S. citrullifolium* A. Br.; *Androcera citrullifolia* Rydb.), belonging also to section *Androceras*, was observed as an escape. This species is distinguished by violet or bluish flowers, more deeply dissected leaves and viscid glandular pubescence of all parts, especially inflorescences. Mexican plant.

2. In external appearance it closely resembles *S. rostratum* and apparently in the USSR is sometimes confused with *S. sisymbriifolium* Lam. (section *Protocryptocarpum* Bitter). Plant strongly armed due to numerous reddish brown prickles covering all parts and viscid with dense glandular pubescence. Leaves once or twice-pinnatifid. Flowers bluish, regular. Anthers all equal. Berry completely enclosed within accrescent calyx, but exposed at maturity by calyx splitting along five lobes, becoming recurved subsequently. This South American plant is now widely distributed in the southern states of North America. Apparently, it may be found in the USSR as a persistent weed.

### Genus 1310. *LYCOPERSICON*<sup>1, 2</sup> Mill.

Mill. Gard. Dict. ed. (1754); Druce in Rep. Bot. Exch. Cl. Brit. Isles, III, 433; C.H. Mull. in U.S. Dep. Misc. Publ. No. 382; Luckwill, Gen. Lycopers. (1943).—*Solanum* L. Sp. pl. (1753) 184, p.p.—*Lycopersicum* Hill, Veg. Syst. (1765) 9, 32; Dun. in DC. Prodr. XIII, 1, 23–27; Luckwill in Journ. R. Hort. Soc. LXVIII, 1, 19.—*Lycopersicum* and *Psolanum* Neck. Elem. Bot. III (1790).—*Amatula* Medic. Ueber Geschl. Malvenfam. (1787) 106 = subgen. *Eulycopersicon* Mull.—*Solanopsis* Börner, Abhandl. Naturwiss. Ver. Bremen, XXI (1912) 282 p.p.

Inflorescence racemose cyme or short fork, terminal, but appearing lateral and extra-axillary at nodes. Pedicel geniculate. Calyx 5-partite (except *L. esculentum*), persistent, accrescent in fruit. Corolla yellow, rotate, 5-partite (except *L. esculentum*) with recurved lobes. Stamens 5 (except *L. esculentum*), with very short filaments, inserted in throat of corolla, anthers connivent into tube with oblong appendages at tip; anthers linear-subulate, dehiscent by longitudinal slit, introrse. Stigma capitate. Fruit succulent berry, usually bilocular (multilocular only in cultivated forms), with

<sup>1</sup> Treatment by J.I. Prokhanov.

<sup>2</sup> From the Greek *lycos*—wolf, *persicon*—peach.



axile placentation, many-seeded, red, yellow or greenish white, with purple stripes. Seeds albuminous, surrounded by mucilaginous covering twice their size. Stem weak, not alate, unarmed, at first erect, later decumbent, 43 creeping, or climbing, herbaceous or sometimes (in tropics) woody at base. Leaves alternate, morphologically simple, imparipinnate, sometimes bipinnate, with alternate pairs of large and small (almost opposite) segments. Inferior lacinules of axillary shoots ("pseudostipules") present or absent. Annual, biennial, or perennial herbs (in tropics, sometimes semishrubs; in USSR, always annuals), glandular, often aromatic. Somatic chromosome number ( $2n$ ) = 24.

Genus type: *L. esculentum* Mill.

The small genus *Lycopersicon* Mill. is undoubtedly closely related to *Solanum* L. It is especially close to the section *Tuberarium* of the latter genus, with which it has identical inflorescences and identical interruptedly pinnate leaves. Recently, Berner even combined this section with the genus *Lycopersicon* into a new genus termed *Solanopsis*. However, the potato is more closely related to the rest of *Solanum* (if only in its anthers), than to the tomato (*Lycopersicon*). Hence, its separation from the genus *Solanum* is not justified.

Beginning from the time of Linnaeus, the tomato also (*Lycopersicon*) is often referred to the genus *Solanum*. This is because the genus was first identified by Tournefort, and later also by Miller, only by the insignificant feature, occurring in cultivation, of the few-chambered character of the ovary and fruit.

In *Lycopersicon*, however, the anthers are characteristic, dehiscing by longitudinal slits, and not by apical pores, as in the cases of *Solanum*, where they have sterile appendages instead. It is precisely these diagnostic features of the large genus *Solanum* which now justify recognition of the tomato as a separate genus.

The genus *Lycopersicon* was first established by Tournefort even before Linnaeus, though it was established only by Miller (Recomm. XXXII of International Rules).

Only 7 species are included in the genus *Lycopersicon*. Apart from the widespread, cultivated *L. esculentum* and the semishrub *L. pimpinellifolium*, they are all confined to a narrow coastal zone in the west of South America, where they grow wild under extreme arid conditions, sometimes even becoming weeds. The range of this genus starts in the southern tropics, passes through Peru, slightly touching Bolivia, and ends in the north of Chile. Besides, it extends also to the Galápagos Islands, where only one species grows. Generally, all species of *Lycopersicon* are southern plants, intolerant to frost. As distinct from the wild species of potato, they do not have any frost-resistant forms.

This genus is naturally divided into two subgenera: subgenus *Eulycopersicon* C.H. Mull. (2 species) and subgenus *Eriopersicon* C.H. Mull. (5 species). They are distinguished by several special features (refer to the key). Moreover, the species of *Eulycopersicon* are always annuals while those of *Eriopersicon* in the tropics are perennial herbs.

- 44 The species of *Eulycopersicon* alone are more important for cultivation. These, especially the main species *L. esculentum*, are propagated for their fruits (berries), which are rich in vitamins and monosaccharides.

The species of *Eriopersicon* are not economically important; their fruits are frequently bitter, even poisonous and in any case inedible. The fruits of *L. peruvianum* Mill. are an exception and are certainly edible. It is not useful for the breeding of cultivated tomatoes, since it is not possible to hybridize with them (like the other species of the subgenus *Eriopersicon*).

1. Fruit greenish or white, sometimes purple at places, even mature fruits usually downy, with slightly recurved calyx lobes; seed thickened, obovoid, glabrous or pubescent only at tip; style exserted; corolla bright yellow; perennial herbs. (Subgenus I. *Eriopersicon* C.H. Mull.)

Inflorescence fork (with furcate peduncle); nodes with bracts; leaves with pair of inferior axillary leaflets ('false stipules'); plant somewhat gray due to dense pubescence ..... \**L. peruvianum* (L.) Mill.

- + Fruit bright red or bright yellow, glabrous and glossy when mature with distinctly recurved calyx lobes; seeds compressed obovoid, sericeous (especially along margin); style concealed within anther tube; corolla light yellow; inflorescence without bracts; leaves without false stipules. (Subgenus II. *Eulycopersicon* C.H. Mull.) ..... 2
- 2. Plant not villous, with faint odor; leaf segments entire or obscurely lobed; corolla up to 2 cm across, 5-partite almost to base, with narrow segments; fruit rarely more than 1 cm in diameter ..... \**L. pimpinellifolium* (Jusl.) Mill.
- + Plant villous, highly aromatic, leaf segments toothed, rarely entire; corolla up to 2.5 cm across, 5–6-partite to middle, with triangular lobes; fruit more than 1 cm in diameter ..... 3
- 3. Calyx half length of corolla or shorter; fruit not exceeding 1.5 cm in diameter ..... \**L. humboldtii* (Willd.) Dun.
- + Calyx at least 2/3 length of corolla; fruit more than 1.5 cm in diameter. .... \**L. esculentum* Mill.

Subgenus I. *ERIOBERSICON* C.H. Mull. in U.S. Dep. Misc. Publ. No. 382 (1940) 16; Luckwill, Gen. *Lycopersicon*, 28.—For characteristics, refer to the key.



Represented by perennial herbs in the extremely arid western zone of South America. Often these, especially the most common of them, *L. peruvianum*, grow as weeds.

45 Species of *Eriopersicon* are normally self-pollinating. However, the mode of pollination is obscure.

Species of *Eriopersicon* are extremely short-day plants. In our latitudes with the normal day they are usually unable to flower (especially the high altitude species).

According to Luckwill, this subgenus has only 5 species.

Among the *Eriopersicon* species, *L. peruvianum* Mill. deserves the greatest attention. It is distinguished by larger but also edible fruits with a distinctive flavor.

*Economic importance.* The species of *Eriopersicon* have lost their special significance. As a result of their shortday photoperiodic response, even in the southern latitudes in our country, they rarely flower under normal conditions. Moreover, they are absolutely useless for selective improvement of cultivated tomatoes due to difficulties in their hybridization.

\**L. peruvianum* (L.) Mill. Gard. Dict. ed. 8 (1768) No. 5; C.H. Mull. in U.S. Dep. Misc. Publ. No. 382; 16; Luckwill, Gen. *Lycopersicon*, 28.—*Solanum peruvianum* L. Sp. pl. (1753) 186.—*Lycopersicum peruvianum* Dun. in DC. Prodr. XIII, 1 (1852) 24.—*Solanum cummutatum* Spreng. Pl. Min. Cogn. Pugill. Prim. I (1812) 18.—*Lycopersicum commutatum* Roem and Schult. Syst. veg. IV (1819) 569.—*L. dentatum* Dun. Sol. Syn. (1816) 4.—*L. chilense* Dun. in DC. Prodr. XIII, 1, 24.—*L. atacamense* Phil. Fl. Atac. (1860) 42.—*L. puberulum* Phil. in An. Mus. Nac. Chil. 1891 (1891) 63.—*L. bipinnatifidum* Phil. An. Mus. Nac. Chil. 1891 (1891) 63.

Perennial (in USSR, annual). Plant with short, straight or crisped hairs, sometimes canescent, very sparsely glandular, with pleasant odor. Stem weak, prostrate. Leaves variable, 4–9 cm long, 2–4 cm broad, with false stipules, more densely pubescent underneath with whitish hairs; larger segments (5)7–9(11), stalked, elliptic-ovate, obliquely rounded near base, acute or obtuse, subentire, sinuate-dentate, or crispate. Smaller segments subsessile, ovate, 1–5 mm long, entire or sinuate. Inflorescence once–twice-dichotomously branched, terminal, longer than stem, (12)15–24(30)-flowered, with 8–10 cm long common peduncle and 5–9 cm long racemose cymes, nodes with ovate or reniform, sinuate, sessile bracts, 5–15 cm broad, on peduncles sometimes underdeveloped; pedicels distichous 5–12 mm. Flowers initially drooping, later erect. Calyx 5-lobed, up to 1.2 cm across, with 6 mm long linear-lanceolate lobes, in fruit 2–3 times as large, narrowly rounded at apex, pubescent outside. Corolla  
46 bright orange-yellow up to 3.5 mm across, 10–13 mm long, 5-partite to

middle, with triangular, crispate, acuminate, spreading lobes and broad band of hairs outside in middle. Anther tube 6–9 mm long, with obliquely bent tip. Style exerted by 1–2 mm, with capitate stigma. Fruit globose, sometimes slightly compressed at sides, 1–2 cm in diameter, bilocular, densely puberulent throughout, not glandular, greenish or subsequently whitish, with purple spots and, in middle of carpels, unequal oblong purple stripes. Seeds numerous, surrounded by bright green pulp, oblanceolate, thickened, light brown, sometimes narrowly winged at end, finely pitted (average weight 0.5–0.8 mg).

Occasionally found in breeding stations of tomatoes. Wild in the coastal desert zone of Peru and north of Chile. Often as a weed. Described from Peru. Type in London.

Subgenus II. *EULYCOPERSICON* C.H. Mull. in U.S. Dep. Misc. Publ. No. 382 (1940) 10; Luckwill. Gen. *Lycopersicon*, 20.—For description, refer to the key.

Represented by annual herbs comprising only two species, widely distributed in hot and moderately warm climates. These species, especially *L. esculentum*, have been well established in cultivation and grow wild and extensively in many places. Since the universally propagated and spontaneously growing forms of tomato are mostly uniform and have no local races, it is clear that their wide distribution over the globe is a comparatively recent phenomenon.

The habitat of both these species is in the western coastal belt of South America, Peru and parts of Ecuador. Both species grow wild as weeds in these regions. Since they, especially *L. esculentum*, have been cultivated in their own habitat for a long time and interbred freely, it is not always possible to differentiate between basically wild and secondarily wild types.

The species of *Eulycopersicon* are usually self-pollinating, a fact that has helped their transformation to annuals, but their cultivation, accompanied by artificial selection for self-fertility in pure variatal lines, is especially longstanding.

However, cross-pollination among these, from time to time, has long resulted in extensive hybridization between both the species included here, namely, *L. pimpinellifolium* and *L. esculentum*.

The day length does not appear to have any effect on the subgenus *Eulycopersicon*, unlike the subgenus described earlier. Both species flower easily and bear fruit at all latitudes (of course, under frost-free conditions), irrespective of the day length.

In this subgenus, all researchers have recognized two independent species: the currant tomato—*L. pimpinellifolium* and the edible tomato—*L.*  
47 *esculentum* with two subspecies. They bear bright-colored fruits with a

pleasant taste. However, in *L. pimpinellifolium*, the fruits are very small and split on maturity. As such this species has not been systematically cultivated. On the other hand, *L. esculentum* is an indispensable food crop.

In spite of the normal self-pollination both these species hybridize freely, sometimes even under natural conditions. In this process, the first generation of hybrids reveals an intense heterosis. Plants twice the size of either of the parents are often obtained. Hybrid seeds, obtained especially for this purpose, are already being used in some countries for a substantial increase in the tomato crop yield.

It is natural that the effect of heterosis in subsequent generations is hardly noticeable. Thus, the hybrid form of the two aforementioned species,  $\times$  *L. humboldtii* (Willd.) Dun., which appeared in cultivation long ago, is morphologically intermediate between them. Following Luckwill, we found it impossible to relate this hybrid to either of the two species; we place it in the third position in the subgenus as an independent intermediate hybrid species—*L. humboldtii* (Willd.) Dun.

Especially characteristic for all species of this subgenus are smooth, glossy, bright-colored fruits, usually (primarily) red, sometimes yellow. This color is due to the presence of carotenoids in the pericarp.

\**L. pimpinellifolium* (Jusl.) Mill. Gard. Dict. ed. 8 (1786) No. 4; C.H. Mull. in U.S. Dep. Misc. Publ. No. 382, 15; Luckwill, Gen. *Lycopersicon*, 26.—*Solanum pimpinellifolium* Jusl. in L. Cent. I pl. (1755) 8; L. Amoen. Acad. IV, 268.—*Lycopersicum pimpinellifolium* Dun. Hist. Solan. (1813) 3; Sol. Syn. 3; in DC. Prodr. XIII, 1, 23.—*L. inodorum* Juss. ex Steud. Nomencl. (1821) 500, pro synon.—*L. racemigerum* Lange, Ind. sem. hort. Haun. 1865 (1866) 26, nomen provisorium.—*L. racemiforme* Lange in Bot. Tidskr. ser. 2, I (1872) 189. Currant tomato.

Annual. Plant branched, puberulent and glandular, with a faint odor. Stem weak, 1–2 m tall, 2–3 mm thick. Leaves narrowly ovate, 4–15(20) cm long, 3–6(12) cm broad, pinnatisect, without false stipules; large segments 5(7), long stalked (stalk 1–10 mm long), ovate or lanceolate, 1–3 cm long, 0.5–2 cm broad, base obliquely cordate or rounded, entire or slightly crenate, dark green above, canescent underneath, small segments ovate or orbicular, 1–10 mm long, 1–7 mm broad, sometimes absent. Inflores-  
48 cence elongated regular bilateral false raceme, only sometimes furcate, 5–10 cm long, 12–30(150) flowered. Pedicels 7–15 mm long, geniculate below flower, slender, about 0.5 mm thick in fruit. Calyx incised to base, with linear-lanceolate lobes, 2.5–3.4(4) mm long (about 1/3 of corolla) and deflexed in flower. Corolla lemon yellow, 12–16(20) mm across, incised almost to base, with narrow lanceolate-acuminate lobes, pubescent outside along midline and distinctly recurved in full bloom. Anther tube 5–7 mm long, with slightly shorter appendages. Style 7–9 mm



long, very slightly exserted. Fruit globose, 1–1.5 cm in diameter, from the very beginning glabrous and glossy, with accrescent 6–7 mm long calyx in 15–20 cm long false raceme. Seeds thick, obovoid about 3 mm long (average weight 1 mg), yellow, glabrous, with only narrow wing at apex; 10–30 per fruit.

Sometimes in breeding nurseries. Wild in western part of South America: Peru, Ecuador? (doubtful), Galápagos Islands. Naturalized in some places in tropical countries. Described from Peru. Type in London.

*Note.* Morphologically close to *L. regulare* Dun. (= *L. pissisi* Phil.), a species belonging however to another subgenus. Their common features (absence of false stipules, leaf shape, structure of inflorescence and seed) and almost similar pubescence make it difficult to distinguish between them in the herbarium. It is no doubt easier to distinguish *L. pimpinellifolium* under natural conditions by its annual character, distinctive aroma and fruit characteristic of the subgenus. One must agree that both these species, although from different subgenera, are in some respects related.

In its habitat, in Peru (and in Ecuador), the currant tomato grows mainly as a weed. Peruvians collect and extensively use its berries in cookery but they do not cultivate this small-fruited tomato as a food plant anywhere.

Recently, *L. pimpinellifolium* has acquired importance for breeding and therefore is often grown in plant-breeding stations. In some places in tropical climates, however, it grows wild.

In Europe, it was first introduced by Joseph de Jussieu, who sent his brother Bernard de Jussieu currant tomato seeds from Peru, naming it the non-odorous tomato.

*Economic importance:* The currant tomato possesses several valuable properties—early maturity and immunity to *Cladosporium flavum*, which makes it interesting in the selection of improved tomato varieties.

Although *L. pimpinellifolium* is not used directly, some of its hybrids (*L. humboldtii*), nevertheless, give a very high yield (due to heterosis) of small fruits, which are used for canning (for example, Burbank's Preserving variety).

- 49 The currant tomato is sometimes grown in gardens merely as an ornamental plant with impressive drooping inflorescences. Under natural conditions the inflorescence rarely exceeds 10 cm in length, but grows much longer in greenhouses, reaching a length of 120 cm (and even more) over the season, yielding up to 150 berries in the process.

\* × *L. humboldtii* (Wild.) Dun. Hist. d. Solan. (1813) 112; in DC. Prodr. XIII, 1, 25.—*Solanum humboldtii* Willd. Hort. Berol. I (1804) 27.—*Lycopersicon esculentum* ssp. *humboldtii* (Willd.) Luckwill, Gen.

*Lycopersicon* (1943) 24.—*L. esculentum* ssp. *intermedium* Luckwill, l.c. (1943) 24.—*L. esculentum* Mill.  $\times$  *L. pimpinellifolium* (Jusl.) Mill.

Annual. Plant somewhat villous and glandular. Leaves interruptedly pinnatisect, usually sparsely villous, with stalked segments; large segments obliquely ovate or cordate, acuminate, more or less dentate, rarely entire; small segments ovate or orbicular-oblong, obtuse, subentire. Inflorescence extra-axillary, unbranched, 5–10(20)-flowered. Calyx 5-partite, with persistent lanceolate lobes,  $1/3$ – $1/2$  as long as corolla. Corolla up to 2 cm across, 5-partite up to  $2/3$  length, with ovate, acuminate lobes. Fruit bilocular, globose, up to 1.6 cm in diameter, very sparsely hairy. Seeds 20–50 per fruit, mostly hairy, winged all around or only at tip (average weight 1.5–2.5 mg).

On accidental plant breeding stations. In tropical countries appears sometimes as a result of natural hybridization of the parent species *L. esculentum* and *L. pimpinellifolium*. Described from a cultivated specimen in the Berlin Botanical Garden. Type in Berlin.

If *L. esculentum* and *L. pimpinellifolium* are to be regarded as independent species, it is essential, in view of the intense heterosis during hybridization, never to assign their intermediate hybrid forms arbitrarily to one of the parent species. Unfortunately, this is exactly what Luckwill (1943) did when he placed *L. humboldtii* and another new form described by him—*intermedium* (intermediate)—in the category of a subspecies of *L. esculentum*.

Since both these forms are clearly intermediate, and one of them is even so named, they should be separated in order to avoid any inconsistency, which is what we are doing here by separating the intermediate hybrid species. In this case, even if the forms *humboldtii* and *intermedium* are both intermediate between *L. esculentum* and *L. pimpinellifolium*, and even identical in calyx length, they nevertheless exhibit other parental characteristics differently.

I consider it better to regard these hybrid forms as two varieties of the same pleomorphic hybrid. Obviously, heterosis is absent in them, being observed only in the first generation of hybrids and not subsequently.

50 Var. *humboldtii* (Willd.) Prokh.—*Solanum humboldtii* Willd. l.c.—*L. humboldtii* (Willd) Dun. l.c.—*L. esculentum* ssp. *humboldtii* (Willd.) Luckwill, l.c.—Plant comparatively less pubescent. Leaves up to 20 cm long and 14 cm broad, large segments serrate, sometimes pinnatisect at base. Inflorescence 5–10-flowered, unbranched. Calyx  $1/3$ – $1/2$  as long as corolla. Corolla 5-lobed for half its length, with ovate lobes. Fruit globose, up to 1.5 cm in diameter, with 30–50 seeds. Seeds rather hairy, winged (average weight 1.5–2.5 mg).

This variety is sometimes found in the USSR in plant-breeding stations.



Var. *Intermedium* (Luckwill) Prokh., comb. nova.—*L. esculentum* ssp. *intermedium* Luckwill, l.c.—Plant villous and glandular, comparatively less branched and darker in color. Leaves up to 23 cm long and 15 cm broad, large segments up to 6 cm long, entire or crenulate, sparsely pubescent. Inflorescence 6–20-flowered, furcate or not. Calyx 1/3 as long as corolla with linear-lanceolate lobes. Corolla 5-partite for about 2/3 length with narrow lobes, 3 mm broad at base. Young fruit dark green, later turning red, up to 1.6 cm in diameter with 20–40 seeds. Seeds hairy, silky when dry, with winged tip (average weight about 2 mg).

This variety was cultivated in England by Luckwill. Although it has not been found in the USSR so far, its future discovery is quite possible.

\**L. esculentum* Mill. sensu ampl. Gard. Dict. ed. 8 (1768) No. 2; C.H. Mull. in U.S. Dep. Misc. Publ. No. 382, 10; Luckwill, Gen. *Lycopersicon*, 20.—*Solanum lycopersicum* L. Sp. pl. (1753) 225.—*Lycopersicon pomum-amoris* Moench, Meth. pl. (1794) 515.—*Solanum luridum* Salisb. Prodr. (1796) 134.—*S. foliosum* Link in Buch. Phys. Besch. Canar. Ins. (1825) 144.—*Lycopersicum esculentum* Alef. Landw. Fl. (1866) 134; Bailey, Stand. Encycl. Hort. ed. 2, 1931–1932, ff. 2231–2233.—*L. lycopersicum* (L.) Karst. Deutsch. Fl. (1882) 966.—*Lycopersicon lycopersicon* Britt. and Brown, Illustr. Fl. III (1913) 168.

Annual. Plant villous, especially young parts, glandular, with strong, pleasant odor. Stem erect at first, later decumbent. Leaves ovate or lanceolate, usually over 20 cm in length, interruptedly pinnatisect, usually with alternating large and small segments with dense bluish gray pubescence underneath, without false stipules. Large segments (5)7(9), stalked, ovate or lanceolate, entire, lobed, or pinnatipartite (leaves here bipinnate!), with sessile or stalked lacinules; small segments sessile or stalked, elliptical  
51 or lanceolate, entire, sometimes absent. Inflorescence shorter than leaves, 3–20-flowered. Calyx 5–8(10)-partite, with acute subulate lobes, enlarging 2–3 times in fruits. Corolla lemon yellow, up to 2.5 cm across, 5–8(10)-partite; corolla lobes recurved, sparsely pubescent on outside along mid-vein. Stamens 5–8(10); anther tube irregular, splitting into groups of 2–3 stamens during flowering. Style very slightly exserted. Young fruit densely velutinous and glandular, subglabrous and glossy when mature. Uniformly sericeous, light brown in color.

Universally cultivated in tropical and temperate zones; in more northern regions—with hotbed forcing of seedlings. Easily naturalized, gradually transforming into wild form. Grows wild in form of ssp. *galeni* only in Peru in coastal region. The ancient region of its cultivation is the western part of South America, Peru and Ecuador. In the USSR: everywhere in extensive cultivation (except the northern regions).

Described from a cultivated specimen in the Chelsea Gardens near London. Type apparently in London.

The origin of the cultivated tomato is generally well known. Our present-day tomatoes with large, smooth, multilocular fruits developed in two stages.

The original wild form of *L. esculentum* is its small-fruited subspecies *galeni*—the cherry tomato. From cultivated tomato was first derived the subspecies *esculentum* and its typical form with large multilocular fruits with ridged lobes resulting from fasciation. This primary stage occurred in Peru, the habitat of the cultivated tomato, even before Columbus. Through prolonged and persistent unintentional seed trials the ancient Peruvians evolved the cultivated tomato in its rib-fruited form. However, strangely enough, at the same time, they also widely cultivated the original small-fruited cherry tomato.

Thus, in the Andes in America, Europeans discovered the cultivated tomato already evolved in the form with lobed fruits that were always quite large. This primitive cultivated tomato was introduced by the Spaniards into Europe shortly after the conquest of Peru. In Europe, the cultivated tomato became common in the 16th century in the southern part under the name of 'Peruvian apple,' especially in Spain and Italy, where it soon became popular. In the northern European countries, however, the cultivated tomato was received unfavorably and with great suspicion due to its possible ill effects on health and was for a long time grown there as an ornamental plant.

Later, the tomato reached the Near East and here in Russia.

The Spaniards brought the tomato, mainly in the small-fruited cherry form, to the Philippines and Indonesia. However, in the Far East, the cultivated tomato remained unknown for a long time.

In short, during the 17th and 18th centuries, in Europe the tomato was cultivated exclusively in its ribbed form, which was already long extinct  
52 in its original habitat in pre-Columbian America. Attempts at obtaining new forms of the tomato were completely unsuccessful for almost the next three centuries.

Subsequently, the second stage in the evolution of the present smooth-fruited cultivated tomato only occurred in Europe in the 19th century, as a modification within the subspecies *esculentum* (which is discussed below).

Hybridization of various forms of *L. esculentum* leads in the first generation to a luxuriant growth of plants, i.e., heterosis. This phenomenon becomes more pronounced as the original parent forms are further separated from one another. The most intense heterosis occurs in the hybridization of cultivated forms with the currant tomato (*L. pimpinellifolium*), with which the former hybridizes easily.

KEY TO SUBSPECIES OF *LYCOPERSICON ESCULENTUM*

1. Flowers 5-merous; calyx shorter than corolla; fruit bilocular, not more than 3 cm in diameter, globose or sometimes pyriform; inflorescence long, racemose, polycarpic, rarely short, furcate ..... a ssp. *galeni* (Mill.) Luckwill.
- + Flowers 6 (or more)-merous; calyx almost equaling corolla; fruit multilocular, over 3 cm in diameter, globose or depressed-globose, often deeply lobed; inflorescence short, furcate, bearing small number of large fruits ..... b. ssp. *esculentum* Prokh.

a. *L. esculentum* Mill. ssp. *galeni* (Mill.) Luckwill, sensu ampl. Gen. *Lycopersicon* (1943) 23.—*Lycopersicon galeni* Mill. Gard. Dict. ed. 8 (1768) No. 1.—*Solanum lycopersicum* L. Sp. pl. (1753) 185. *S. pseudolycopersicum* Jacq. Hort. Vindob. (1770) 4.—*Amatula flava* Medic. Ueber. Geschl. Malvenfam. (1787) 106.—*Solanum spurium* Gmel. Syst. nat. II (1796) 384. —*S. pomiferum* Cav. Descr. pl. (1802) 112.—*Lycopersicum cerasiforme* Dun. His. d. Solan. (1813) 113; Sol. Syn. 4; in DC. Prodr. XIII, 1, 26, *L. pyriforme* Dun. Hist. d. Solan. (1813) 112; Sol. Syn. 7; in DC. Prodr. XIII, 1, 26.—*Lycopersicum spurium* (Gmel.) Link, Handb. I (1829) 566.—*L. philippinarum* Dun. in DC. Prodr. XIII, 1 (1852) 27.—*L. esculentum* var. *cerasiforme* (Dun.) A. Gray, Sun. Fl. II (1886) 226; C.H. Mull. in U.S. Dep. Misc. Publ. no. 382, 13.—*Solanum lycopersicum* auct. L. p.p.; Blanco, Fl. Filip. ed. 1, 134.

- Annual. Plant with vegetative parts similar to the typical subspecies, but somewhat smaller. Leaves ovate or ovate-lanceolate, 15–25 cm long, 53 8–15 (17) cm broad, interruptedly pinnatisect (without stipules); segments stalked, with cordate or rounded base, 2.5–7 cm long, 1–3 cm broad, somewhat sinuate-dentate, sometimes even lobed or divided at base, small segments suborbicular or lanceolate, 0.5–1.5 cm long, obtuse or acute, subentire. Inflorescence usually racemose, long, 5(6)–10(12)-flowered, rarely (in pear-shaped forms) furcate and somewhat depleted. Flowers 5-merous. Calyx only slightly exceeding  $\frac{2}{3}$  length of corolla, with 5–7 mm long lobes, accrescent in fruit up to 15 mm. Corolla about 1 cm long with recurved narrowly lanceolate, about 5 mm, lobes. Fruit bilocular, globose or sometimes pyriform, 1.5–2.5(3) cm in diameter, red or yellow, with 30–60 seeds. Seeds similar to those of type, or slightly smaller and less compressed, densely pubescent, usually without distinct wing (average weight 1.8–2.5 mg).

Frequently cultivated, often growing wild in the tropics as a weed. It grows wild along the western sea coast of South America: Peru (possibly also Ecuador). Widely naturalized in tropical countries. Described from



cultivated specimen in Chelsea Gardens, near London. Type apparently in London.

The typical form of this subspecies—*L. esculentum* ssp. *galeni* var. *galeni*, the so-called cherry tomato, in spite of its relative morphological constancy, undoubtedly is on the one hand the original wild form among all cultivated tomatoes while on the other even by itself in its initial form it was being cultivated for a long time on a mass scale in its native habitat and later also in other countries on a smaller scale.

In its native habit at in Peru, and also in neighboring Ecuador and Bolivia, the cultivation of the cherry tomato (*L. esculentum* ssp. *galeni* var. *galeni*) is very ancient, having flourished there until recent times (as late as 1906 in the city of Quito).

Most surprising of all was the enduring fondness of the local population for the small-fruited cherry tomato when, even in pre-Columbian America, the cultivated tomato with large, even though ribbed-lobed fruits, was available. Moreover, *L. esculentum* ssp. *galeni* var. *galeni* was brought by the Spaniards across the Pacific Ocean to the Philippines, from where it was even described as *Lycopersicum philippinarum* (1852).

*Note.* As an innovation, I considered it necessary to combine the pear tomato (*L. pyriforme* Dun.) not with the cultivated tomato—*L. esculentum* ssp. *esculentum*, as has been done by both the authors of monographs on the genus *Lycopersicon*, Cornelius Muller and Luckwill, but with the cherry tomato, to which it is undoubtedly closer. If we follow Luckwill's key to the subspecies of *L. esculentum*, then from the pear-shaped tomato (var. *pyriforme*) we do not arrive at *L. esculentum*, where Luckwill has placed it, but at the cherry tomato—*L. esculentum* ssp. *galeni*, for the simple reason that the flowers of the pear tomato are 5-merous, just like those of the cherry tomato.

- 54 Formally, because its 5-merous flower and the bilocular ovary, which are the main features distinguishing the cherry tomato (ssp. *galeni*) from the cultivated tomato (ssp. *esculentum*), the pear tomato (var. *pyriforme*) must be related to the cherry tomato (ssp. *galeni*), although the pear tomato has a slightly shortened inflorescence and somewhat larger fruits. These explicit cultigen characteristics of the pear tomato, which have evolved independently, confused both the authors in correctly identifying the status of this tomato. Muller correctly writes (1940) about the pear tomato: "This variant, apparently, has most likely originated from the wild prototype of the species (i.e., from the cherry tomato—J.P.), rather than from the cultigen but in its appearance bears a closer resemblance to the latter."

Since the pear tomato originated independently from the cherry tomato, a fact which cannot be denied, it is no longer possible to refer var. *pyriforme* to the cultivated *L. esculentum* ssp. *esculentum*. According

to the rules of species classification, var. *pyriforme* should be referred to the cherry tomato—*L. esculentum galeni*, as we have done.

*Economic importance:* *L. esculentum galeni*, especially its pear-shaped var. *pyriforme*, in spite of having lost its importance in mass cultivation, is often grown for the specific purpose of obtaining small tomatoes required for preservation and pickling. Besides, these forms are often cultivated as curiosities with attractive edible fruits.

Var. *galeni* Prokh.—*L. galeni* Mill. l.c.—*L. esculentum* ssp. *galeni* (Mill.) Luckwill, l.c. 23.—*Solanum lycopersicum*  $\beta$ . L. l.c.—*S. pseudolycopersicum* Jacq. l.c.—*Amatula flava* Medic. l.c.—*Solanum spurium* Gmel. l.c.—*L. cerasiforme* Dun. l.c.—*L. spurium* (Gmel.) Link, l.c.—*L. philippinarum* Dun. l.c.—*L. esculentum* var. *cerasiforme* (Dun.) Alef. l.c.—*L. lycopersicum* auct., L. p.p.; Blanco, l.c.—Plant with vegetative parts similar to those of typical subspecies but somewhat smaller. Inflorescence usually racemose, not furcate, 6–12-flowered. Calyx only slightly exceeding 2/3 of corolla. Fruit globose, up to 2(2.5) cm in diameter, with 30–60 seeds. Seeds similar to those of type, or slightly smaller and less compressed, densely tomentose, usually without distinct wing (average weight 1.8–2.5 mg).

This is the original wild form of all cultivated tomatoes, to which they revert on becoming wild. It grows wild in Peru. In other countries, it is either cultivated or wild (see above).

Var. *pyriforme* (Dun.) Alef. Landw. Fl. (1866) 135; Luckwill, Gen. *Lycopersicon* (1943) 23.—*L. pyriforme* Dun. (1813) l.c.—*Solanum pomiferum* Cav. l.c.—*Lycopersicon esculentum* f. *pyriforme* (Dun.) C.H. Mull. l.c. 12.

Plant parts identical to those of typical subspecies. Inflorescence  
55 often furcate, short. Fruit pyriform, slightly or considerably constricted at neck, larger than cherry tomato (up to 3 cm in diameter). This cultigen appeared independently of the former and is in no way connected with other cultivated tomatoes. The well-known variety, *Korol Gumbert* (King Humber), which is important for the canning industry, belongs there.

b. *L. esculentum* Mill. ssp. *esculentum* Prokh.—*L. esculentum* Mill. Gard. Dict. ed. 8 (1768) No. 2.—*Solanum lycopersicum* L. (excl. var.  $\beta$ ), Sp. pl. (1753) 185.—*Lycopersicon solanum* Medic. Bot. Beobacht. 1783 (1784) 245.—*L. pomum-amoris* Moench, Meth. pl. (1794) 315.—*Lycopersicum esculentum* Dun. Hist. d. Solan. (1813) 113; Sol. Syn. 4; ex DC. Prodr. XVIII, 1, 26; Guss. Enum. pl. Inar. 230.—*L. macrophyllum* Guss. l.c. (1854) 230.—*Lycopersicon esculentum* ssp. *typicum* Luckwill, Gen. *Lycopersicon* (1943) 21.

Annual. Stem densely villous and glandular. Leaves pubescent, 10–35 cm long, 6–30 cm broad. Leaf segments large, 3–10 cm long,



1.5–6 cm broad, ovate or lanceolate, deeply incised, pinnatisect at base (leaves bipinnate), smaller ones elliptical or lanceolate, 0.2–2 cm long, entire. Inflorescence usually furcate, short, 3–12-flowered. Flowers more often 6-merous, first one in inflorescence fasciated and polymorous. Calyx 6-partite almost to base, nearly as long as corolla, up to 1 cm long, accrescent in fruit up to 2.5 cm. Corolla 6-lobed up to middle, with broadly triangular (or lanceolate) lobes, up to 1 cm long and up to 0.6 cm broad at base. Fruit 3–10 cm in diameter, multilocular, first in inflorescence often fasciated and irregularly lobed (with 250 seeds, according to Luckwill). Seeds large, densely pilose, sometimes with winged margin, sericeous, glossy in dry state (average weight 2.5–3.5 mg, according to Luckwill).

Plant of mass cultivation, universally grown (except in extreme north).

*General distribution:* Tropical and Temperate zones, in cultivation. Described from cultivated specimen in Chelsea Gardens, near London. Type apparently in London.

The subspecies of cultivated tomato, ssp. *esculentum*, was obtained as a result of prolonged cultivation by the ancient Peruvians. It had red as well as yellow, large, multilocular, but ribbed-lobed, fruits. It was exactly in this form that it was brought in the 16th century by the Spaniards to Europe, where it did not undergo any modification for almost three centuries.

56 Toward the end of the 18th century, the first changes in the form of cultivated tomato began to emerge. From the hitherto dominant, typical rib-fruited variety—*L. esculentum* ssp. *esculentum* var. *esculentum*—begins the selection of the smooth-fruited type, with some reduction in the fruit size, which was unavoidable in the process, at least in the beginning. Such forms often appeared even earlier. As early as 1716, Tournefort reports one of them under the name *Lycopersicon fructu rubro non striato*. Later in 1820, Sabin names a similar form as a small tomato (Tomato petito), bearing in mind, of course, the size of the cultivated tomato. But these initial efforts to obtain a smooth-fruited cultivated tomato were not successful until the size of this tomato increased to that of the rib-fruited forms. This was achieved only toward the end of the 19th century, when hitherto lesser known smooth-fruited tomatoes began to replace the earlier rib-fruited ones. In the 20th century, the smooth-fruited tomato became so common in cultivation that Bailey suggested for it the name var. *commune* Bailey, which means the common variety. At the present time, the rib-fruited variety var. *esculentum* has been relegated to second place, surviving in a few areas in southern countries (Italy, etc.).

However, as late as in 1866, Alefeld fails to list the smooth-fruited variety (var. *commune*) in his list of tomato varieties.

At the beginning of the 19th century, there appeared, suddenly, a new variety—var. *grandifolium* Bailey, with large leaves as in the potato.

Finally, quite recently, at the beginning of this century, var. *validum* Bailey appeared. This dwarf tomato has strongly rugose leaves.

*Varieties:*

Var. *esculentum* Prokh.—Fruits large, often flattened on top, ridged-lobed or even with ridged segments (due to fasciation). Leaves with 7–9 large stalked segments and small segments, not rugose.

In Western Europe a few cultivars are related to var. *esculentum* (found in USSR) as, for example, *ficarazzi*.

Var. *commune* Bailey, Man. cult. pl. (1925) 656.—*Lycopersicum esculentum* var. *vulgare* Bailey, Stand. Encycl. Hort. (1922) 1931, non Alef. (1866).—Fruits smooth and regular, globose or oblong, multilocular, but not fasciated. Leaves with 5–7 large stalked segments and small segments, not rugose.

This group includes most of the present-day cultivars: *Erliana*, etc.

Var. *grandifolium* Bailey, Stand. Encycl. Hort. (1922) 1932.—*L. macrophyllum* Guss. Enum. pl. Inar. (1854) 130.—Leaves large, less incised, initially entire, later incised only into three or five segments. Segments shortly stalked or sessile, terminal very large, up to 16 cm long and 7 cm broad.

Variety *Mikado* and others.

- 57 *Note.* Luckwill (1943) is wrong in designating the time of appearance of this variety as the beginning of the 20th century. Actually, it was already known to Gussone in 1854 and, therefore, must have appeared earlier.

Var. *validum* Bailey, Stand. Encycl. Hort. (1922) 1931.—*Ic.*: Bailey, l.c. tab. 2233.—A short plant, compact, with an erect, strong stem, and comparatively shortened internodes. Leaves up to 25 cm long and 20 cm broad; segments convergent, surface rugose and glossy.

Dwarf cultivar *ponderosa* and others.

*Note.* Apparently, of recent origin (Luckwill, 1943).

Subtribe 2. *SARACHINAE* Baehni in Candollea, X (1943–1946) 479.—Tribus *Witheringeae* Miers. Illustr. S. Amer. pl. I, Appendix (1846–1850) 179, p. max. p.—*Solaninae* Wettst. in Pflanzenfam, IV, 3b (1895) 18 p.p.—Corolla with short tube. Lobes in bud valvate, curved inward. Anthers dehiscing by longitudinal slit, rarely by apical pores. Calyx slightly accrescent in fruit. Embryo arcuate or spiral.

### Genus 1311. *CAPSICUM*<sup>1</sup> L.

L. Sp. pl. (1753) 188.

Calyx broadly campanulate to almost cyathiform, either with 5(6–7) small teeth or without, truncate at tip. Corolla rotate, 5-lobed to middle.

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<sup>1</sup> Apparently, from the Latin *capsa*—a container, a box.

Filaments inserted at corolla base, longer than free and parallel anthers. Fruit berry with juiceless pericarp, bulging, with cavity inside, bilocular only in lower part, rarely trilocular. Shrubs or semishrubs, cultivated usually as annuals, with entire leaves. Flowers in forks of branches, solitary or paired, sometimes (due to shortening of internodes) in clusters.

A small number of species in South and Central America. Some widely cultivated as vegetables in countries with warm temperate and tropical climates.

- \**C. annuum* L. Sp. pl. (1753) 188; Fingerh. Monogr. Caps. (1832) 12; Schmalh. Fl. II. 250; Irish, Rev. gen. Caps. 65; Grossh. Fl. Kavk. III, 354; Kom. and Alis. Opred. rast. Dalnevost. kr. I, 915; Smith and Heiser in Am. Journ. Bot. 38, No. 5, 364.—*C. grossum* L. Mant. (1767) 47.—*C. caerulescens* Bess. Cat. hort. Cremen. (1831) 27.—*C. longum* DC. Cat. hort. Monsp. (1813) 86.—*C. cordiforme* Mill. Gard. Dict. ed. 58 VIII (1768) No. 2.—*C. cerasiforme* Mill. l.c. No. 5.—*C. conoides* Mill. l.c. No. 8.—*C. fasciculatum* Sturt. in Bull. Torr. Bot. Club, 15 (1888) 15.—*C. frutescens* auct. (non L.): Bail. Gent. Herb. 1 (1923) 128; Man. cult. pl. 873 (1949) p.p.—*S. mexicanum* Hasenb. in Tr. prikl. bot. gen. i sel. XXIX, 1 (1951) 63, nom. abort.—*l.c.*: Fingerh. Monogr. tab. I, II, III, V, VI, VII, IX, X; Rchb. Ic. fl. Germ. XX, tab. 1634, f. II, III; Gazenb. l.c. figs. 3–6; Alpatov, Pertsy i baklazi, figs. 2–10. Pepper.

Cultivated as annual. Stem 30–90(130) cm tall, erect or flexuous, glabrous or pubescent, cylindrical, at least in lower part, branched usually from very base, rarely simple, branches mostly 4-angled, glabrous, or pubescent. Leaves opposite or lower ones alternate, ovate to lanceolate, tapering above, with cuneate base, 2–13.5 cm long, dark green above, lighter underneath, glabrous or variously pubescent, denser underneath, especially along veins; petiole long, often equaling lamina, glabrous or diffusely pubescent. Flowers solitary, very rarely in pairs. Peduncle erect or somewhat drooping, thick or slender. Calyx campanulate to cyathiform with 5(7) mostly short teeth, surrounding fruit base or not. Corolla 5–11 mm long, white, dull white, or with violet spots, or violet, with 5(7) ovate, acuminate lobes. Anthers grayish violet. Fruit stalk erect or somewhat deflexed, thickened above. Fruit 5–12(15) cm long and up to 8 cm in diameter, extremely variable in size, shape, and color: globose, ovoid, cylindrical, conical, narrowly conical, trunk-shaped, green or yellow in unripe condition, mature fruit bright red, orange, yellow, yellowish brown, dark violet, or dark olive; the fruits of different varieties vary in taste from pungent hot to sweet, completely free of pungency. Seeds 2.5–5 cm [mm] long, light yellow, compressed, mostly reniform, finely reticulate with distinctly thickened rim around micropyle. Flowering from middle of June. Fruiting from second half of July to November.



Cultivated in many varieties.—*European USSR*: Upper Volga (southern part), Upper Dnieper (southern part), Middle Dnieper, Volga-Don (southern region), Trans-Volga Region, Upper Dniester, Bessarabia, Black Sea Region, Crimea, Lower Don; *Caucasus*: all regions; *Western Siberia*: Upper Tobol (southern region); *Soviet Central Asia*: all regions but mainly the southern region; *Soviet Far East*: Ussuri (southern region). *General distribution*: only in cultivation, North, Central (origin?), and South America and in regions with warm temperate and tropical climates in Europe, North and East Africa, South and East Asia. Described from cultivated specimen. Type in London.

*Note.* The number of cultivars in the world assortment of the red pepper is very large. For their nomenclature, nearly 90 specific names have been suggested, not counting the vast number of separated varieties and forms. Earlier authors of monographs on the genus *Capsicum* have recognized a large number of species belonging to this genus: Fingerhuth (1832) recognized 25 species, Dunal (1852), 50. Later taxonomists, however, arrived at the conclusion that the numerous forms of *Capsicum* in culture are derived from only a few species. Some authors (Bailey, 1923; Erwin, 1932) assign all the diversity of cultivated *Capsicum* to a single species, giving it the name of one of the two species initially established by Linnaeus (1753), namely *C. frutescens* L., and placing the other—*C. annuum* L. as its synonym. In a recently published paper, however, another point of view prevails, which was first put forth by Asa Gray and subsequently introduced by Irish (1898) in his monograph. Irish and other authors (Shaw and Khan, 1928; G. Smith and C.B. Heiser, 1951) consider that a vast majority of the commercial varieties of *Capsicum* should be assigned to *C. annuum* L. and a comparatively small group (of late-maturing and highly thermophilic varieties cultivated mainly in Central and South America, in the southern parts of the United States, and in those of Asia) to *C. frutescens* L. Smith and Heiser differentiated two more species of the genus *Capsicum*, *C. pubescens* Ruiz. and Pav. and *C. pendulum* Willd. (morphologically well isolated from *C. annuum* and *C. frutescens*), the cultivation of which was localized in Central and South America. The necessity of differentiating, among the main mass of cultivars of *Capsicum*, the two species—*C. annuum* L. and *C. frutescens* L.—confirms that they differ not only in morphology but also in physiology. Smith and Heiser have shown that varieties of one species usually do not hybridize with varieties of the other; even in rare cases, when single fruits do appear, their seeds are nonviable or do not develop at all. However, intervaretal hybridization within each of these species takes place easily and results in the appearance of new forms. A Soviet expert on cultivated *Capsicum*, V.L. Gazenbush (l.c.), separated from the group of varieties assigned by foreign authors to

*C. annuum* L. one more species in which he combined *C. angulosum* Mill. and the group of forms '*C. annuum abbreviatum* Fingerh.' Gazenbush, violating the International Rules of Botanical Nomenclature, proposed a new name, his own unauthorized (*nomina abortiva*) name, to this species (in which case if accepted should bear the name *C. angulosum* Mill.), as also to the two other species studied by him—*C. annuum* L. and *C. frutescens* L. These names cannot be supported, and even so, they would only add to the large synonymy of species of the genus *Capsicum*.

60 *Economic importance.* In the southern regions of the USSR, the red pepper is widely cultivated. It is an important raw material for the vegetable canning industry and is also used in the vodka liqueur industry. Pungent varieties of the pepper serve as a flavoring for various dishes and also as a spice in various preparations of salt pickling, marinades, and preserves, while the sweet varieties are used directly in food in the stuffed form and as a salad. The flavoring properties of the pepper—its pungency and spiciness—depend on the presence of the alkaloid capsaicine, whose content in the fruit varies from 0.2% to 0.8%. The pericarp is also found to contain an alkaloid similar to coniine, and solanine. A small quantity of acids (citric and palmitic or hexadecanoic) as well as fatty and essential oils are present. The skin of the fruit contains a red coloring substance. The dry matter is 5–12% in sweet pepper and up to 20% in hot pepper. The ash contains a significant quantity of phosphorus, calcium, and potassium salts that are beneficial to human beings, while the seeds contain a rather high percentage of fatty oil. Fruits of the pepper are very rich in vitamins C and A: 100 units of dry matter contain 270 mg of vitamin C in the sweet varieties and 380 mg in the pungent varieties. The vitamin A content is 9–12 mg (Alpatev, 1953). In relation to the vitamin content, peppers occupy first place among vegetable crops. An extract of sweet pepper is one of the best remedies against scurvy. The pepper has long been used in home and standard remedies, for external application and also as a warming agent in rheumatic and other pains in the muscles and bones. Powdered pepper causes an extreme irritation in the mucous membrane. Tinctures and infusions of hot pepper are used as a stimulant, as an astringent and disinfectant in diarrhea, and also as a remedy for toothache. At the fruiting stage, the pepper is an ornamental plant and is, therefore, sometimes grown indoors.

Subtribe 3. *MARGARANTHINAE* Baehni in Candollea, X (1943–1946) 479.—Trib. *Witheringeae* Miers, Illustr. S. Am. pl. I, Appendix (1846–1850) 179, p. min. p.—Corolla tube short, scarcely exceeding limb, limb in bud plicate-convolute. Calyx in fruit accrescent; stamens 5, anthers dehiscing by longitudinal slit.



### Genus 1312. *PHYSALIASTRUM*<sup>1</sup> Makino

Makino in Bot. Mag. Tokyo, XXVIII (1914) 20.—*Chamaesaracha* Fr. and Sav. Enum. pl. jap. II (1879) 454, non A. Gray (1876).

Calyx broadly campanulate, 5-lobed, accrescent in fruit but not inflated, somewhat fleshy. Corolla campanulate, limb shallowly 5-partite, slightly plicate inward, with 5 pairs of nectaries in middle opposite lobes.

- 61 Fruit rather dry berry, compactly enclosed within slightly shorter calyx; seeds oblate, pitted-rugose. Perennial herbs, with palmately branched root, succulent, dichotomously branched stem and axillary flowers, solitary or in clusters of 2–5.

This genus includes 4 species widely distributed in Japan: *P. japonicum* (Fr. and Sav.) Honda [*Chamaesaracha watanabei* Yatabe = *Physalias-trum savatieri* (Mak.) Mak.], *P. kumurai* Mak., *P. chamaesarachoides* (Mak.) Mak. and *P. echinatum* (Yatabe) Mak.; the last species is also distributed widely over the Asian continent. It is not yet clear whether the two Chinese (Hopeh province) species described under the names *Chamaesaracha sinensis* Hemsl. and *C. heterophylla* Hemsl. are related to the genus *Physaliastrum*, in view of the absence of materials on these species (report on the 'closed' calyx raised doubts).

1. *P. echinatum* (Yatabe) Makino in Bot. Mag. Tokyo, XXVIII (1914) 21.—*Chamaesaracha japonica* Fr. and Sav. Enum. pl. jap. II (1879) 454, p. min. p.—*C. japonica* Makino, Illustr. fl. Jap. I (1891) 1; in Bot. Mag. Tokyo, XXII, 33; Kom. Fl. Man'chzh. III, 402; Nakai, Fl. Koreana, II, 115; Kom. and Alis. Opred. rast. Dalnevost. kr. II, 912; non Fr. and Sav.—*C. echinata* Yatabe in Bot. Mag. Tokyo, V (1891) 317, 355.—*P. japonicum* Kitamura in Acta phytotax. and geobot. VI (1937) 19; Kitagawa, Lineam. fl. Mandsh. 390, non Honda.—*lc.*: in Bot. Mag. Tokyo, V, tab. XXX; Iconogr. Jap. 1, 2, tab. 83.

Perennial. Rootstock thickened above, fleshy, with palmately spreading fusiform thickened branches. Stem erect, 40–100 cm tall, angular, dichotomously branched above, somewhat pilose, succulent. Leaves up to 10 cm long and 6.5 cm broad, opposite (often alternate in unbranched lower part of stem), unequal, ovate, oblong-ovate or elliptical-ovate, usually short-acuminate rarely rather long-acuminate, with oblique decurrent base and scattered hairs on both surfaces, densely so along veins, margin ciliate. Inflorescence 1–2-flowered, rarely 3–5, pedicels erect at first, 5–7 mm long, in fruit drooping, up to 5 cm in length, thickened above. Calyx broad, with short, broadly triangular, subobtuse or acute teeth, covered, usually densely, with articulate (like those on stem and leaves) long crispate hairs. Corolla

<sup>1</sup> Similar in appearance to the genus *Physalis* L.

about 2.5 times as long as calyx, 5.5–8 mm long, campanulate, with plicate limb, cleft into broad triangular ciliate lobes; densely covered outside with appressed very fine hairs, inside with dense pentangular ring of hairs, with 5 greenish nectaries in middle opposite lobes of limb. Stamens with  
62 slender filaments, inserted at corolla base; anthers globular. Style filiform with capitate stigma; ovary glabrous, ovoid. Berry almost dry, globose, white, partially (apex exposed) enclosed within green somewhat fleshy calyx, 10–15 mm in diameter, sparsely covered with thickened, soft acerose base of hairs. Seeds reniform pitted-reticulate, light brown with dark reticulum formed by fine dark septa of flat pits. Flowering from June to July. Fruiting from August (Plate III, Fig. 3).

In shady forests and scrub along banks of rivers and rivulets, isolated plants. *Soviet Far East*: Ussuri (in southern region). *General distribution*: China (southern Manchuria, northeastern China), Korea, Japan. Described from Japan (Mount Nikko on Honshu). Type in Tokyo(?).

*Note.* This species is still sometimes combined or confused with *P. japonica* (Fr. and Sav.) Honda, which, however, is easily distinguished from *P. echinatum* by large, 10–15 mm long flowers, with calyx glabrous or sparsely shortly appressed hairy outside and narrow, almost lanceolate, long acuminate chartaceous leaves.

Subtribe 4. *PHYSALIDINAE* Baehni in Candollea (1943–1946) 479.—Corolla campanulate or shortly infundibuliform with short tube and plicate-convolute limb. Calyx strongly accrescent in fruit, often inflated, usually much larger than enclosed berry. Anthers dehiscing by longitudinal slit.

### Genus 1313. *PHYSALIS*<sup>1</sup> L.

L. Sp. pl. (1753) 182.

63 Calyx campanulate, accrescent after flowering, vesicularly inflated, 5–10-ribbed, teeth convergent at apex. Corolla with short tube and broad flat, sinuate or 5-lobed limb. Stamens shorter than limb, anthers dehiscing by longitudinal slit. Fruit bilocular, globose, succulent berry enclosed in inflated, sometimes much larger calyx. Herbs with entire or irregularly dentate or lobed, mostly opposite leaves and with solitary axillary flowers.

This genus includes about 110–120 species, a large majority of which are distributed in South and North America, in regions of tropical and warm climates, a small number growing in countries of Southeast Asia. One species has reached far into Soviet Central Asia, while two grow in Europe.

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<sup>1</sup> *Physalis*—in Greek, a bladder, indicating a vesicular inflated calyx in fruit.

1. Calyx orange-red in fruit; corolla white, rotate ..... 2
- + Calyx greenish in fruit, yellowish green or brownish; corolla yellow, often with violet or purple throat, shortly infundibuliform ..... 4
2. Pedicels in flower as well as fruit patently pilose; calyx in fruit subglobose, sharply tapering toward apex, densely pilose outside ..... 1. *P. alkekengi* L.
- + Pedicels from very first glabrous or with few hairs; calyx in fruit elongate, ovoid, gradually tapering toward apex, glabrous or very sparsely hairy ..... 3
3. Calyx teeth as long as tube or little shorter; fruiting calyx (3)3.5–4.5(5) cm long, glabrous; berry orange, with whitish or yellowish seeds; leaves usually broadly ovate, rarely ovate ..... 2. *P. glabripes* Pojark.
- + Calyx teeth 2/5–2/3 as long as tube; fruiting calyx (3.7)4–5(5.8) cm long, sometimes along with fruit stalk with a few hairs; berry orange-red with yellow seeds; leaves mostly ovate, sometimes mixed with broadly ovate ones ..... 3. *P. praetermissa* Pojark.
4. Fruitting calyx with 5 sharp, thick, winglike ribs; corolla 6–10 mm across, pale yellow with purple throat ..... \**P. pubescens* L.
- + Fruitting calyx without prominent thick ribs, corolla larger ..... 5
5. Leaves 3–6 cm long, oblong-ovate, usually dentate with very oblique base, subglabrous like stem; ripe berry filling and often tearing calyx; annual plant ..... \**P. ixocarpa* Brot. and Hornem.
- + Leaves 6–15 cm long, with deeply cordate base, almost always entire, leaves and stem densely puberulent to almost tomentose; ripe berry much smaller than surrounding calyx. Large perennial plant ..... \**P. peruviana* L.

Section 1. *Megista* (Fourr.) Rydb. in Mém. Torr. Bot. Club, IV, 5 (1896) 322.—Gen. *Megista* Fourr. in Ann. Soc. Linn. Lyon. nouv. sér. XVII (1869) 115.—*Physalis* subgen. *Alkekengi* Bitt. in Engl. Bot. Jahrb. 45 (1911) 501.—Corolla white, rotate, with 5-lobed limb. Calyx orange-red in fruit, endocarp with grit cells.

64 Oligotypic section with two species in the Mediterranean Region and Europe, one in Soviet Central Asia and 5–6 (not yet fully investigated) in Southeast Asia (from the Ussuri Region and Japan to Yunnan Province in South China).

1. *P. alkekengi* L. Sp. pl. (1753) 183; M.B. Fl. taur.-cauc. I, 165; Ldb. Fl. Ross. III, 186; Dun. in DC. Prodr. XIII, 1, 438; Boiss. Fl. or. IV. 287; Schmalh. Fl. II, 250; Grossh. Fl. Kavk. III, 354.—*P. halicacabum* Crantz, Inst. rei herb. II (1766) 370.—*Alkekengi officinarum* Moench, Meth. pl. Suppl. (1802) 177.—*Megista maxima* Fourr. in Ann. Soc. Linn. Lyon. nouv. sér. XVII (1869) 115.—*Ik.*: Rchb. Ic. fl. Germ.



XX, tab. 1630; Fedtsch. and Fler. Fl. Evrop. Ross. fig. 769; Hegi, Illustr. Fl. Mittel-Eur. tab. 223, f. 1-1a; f. 3405a, 3406.—Exc.: FRG, No. 630.

Perennial. Plant with creeping, slender, 1.5–3 mm thick, woody, branched rhizome with clusters of slender and soft adventitious roots at nodes. Stem 20–100 cm tall, erect, angular-sinuate, simple or branched in upper part, covered with patent crispate hairs, rather densely so in upper part and at nodes. Leaves opposite, or in lower part alternate, 4–15 cm long and 1.8–8.5 cm broad, thin, sparsely hairy on both surfaces, densely so along ribs, oblong-ovate or ovate, rarely rhombic-ovate, usually long acuminate, with base decurrent on upper part of petiole, often oblique, entire or obscurely regularly crispate-dentate, a few leaves sometimes with 1(2) pairs of triangular teeth in middle part; margin shortly setose-ciliate; petioles in lower leaves  $2/5$ – $2/3$  and in upper leaves  $(1/5)1/4$  as long as lamina. Pedicels erect in flowers, 7–17 mm patently pilose, pubescence persisting until fruit-maturity. Calyx campanulate, with triangular or lanceolate teeth, equaling tube or slightly shorter, densely pubescent outside, hairs patent on tube, antrorse, somewhat appressed on teeth, margins of teeth with patent setaceous cilia. Corolla about 2 cm across, whitish, with very short tube and broad limb, lobes short, broad, tapering rather sharply in triangular, acute tip. Berry orange-red, 1.2–1.7 mm (cm) in diameter, enclosed within bright orange, vesicular, subglobose calyx with teeth converging sharply at apex, sparsely hairy on outside, 2.5–4.5 cm long. Fruit stalk somewhat pilose,  $(1/3)1/2$ – $2/3$  as long as calyx. Seeds whitish or yellowish, reniform, about 2.5 mm long, 2 mm broad, finely reticulate. Flowering from May to first half of August. Fruiting from June to September.

- 65 In open forests, along forest edges, in scrub, along ravines, on coastal lowlands, and also in waste lands, gardens, and kitchen gardens. On mountains up to the higher regions of the forest zone. *European USSR*: Upper Dnieper (southern region), Middle Dnieper (southern region), Upper Dniester, Bessarabia, Black Sea Region, Crimea, Lower Don (southwestern regions); *Caucasus*: all regions; *Soviet Central Asia*: introduced, very rare; Syr Darya (vicinity of Tashkent), Pamiro-Alai, mountainous Turkmenia. *General distribution*: Scandinavia—introduced (southern region, in Denmark), Central and Atlantic Europe (northeastern France and Belgium; in both latter regions it is doubtful whether it is native), Mediterranean Region (Italy). Balkan States-Asia Minor, Armenia-Kurdistan; in North America an escape, naturalized in some places. Described from Italy. Type in London.

*Economic importance*. Bitter and sour berries with an unpleasant taste, used in food in some places. They contain sugar, citric acid, and traces of an alkaloid, but not the toxic solanine which, however, is present in other parts of the plant. Earlier, the fruits were used in medicine as

a diuretic, analgesic, and styptic and also against rheumatic and neuralgic pains. Sometimes used for coloring butter. Leaves, stem, and especially the calyx (in fruit) contain the bitter amorphous substance, physalin: the crystalline red pigment of the calyx, physalin  $C_{72}H_{116}O_4$ , undergoes hydrolysis to yield palmitic acid and zeaxanthin. Sometimes grown as an ornamental plant. Propagated by seeds as well as rhizomes.

2. *P. glabripes* Pojark. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XVI (1954) 325.—*P. alkekengi* auct.: Palib. in Tr. SPb. bot. sada, XVIII (1910) 165; XXI, 227; Kom. Fl. Manchzh. III, 401; Kom. and Alis. Oprod. rast. Dalnevost. Kr. II, 912, non. L.—*P. francheti* var. *bunyardii* Kitag. Lineam. fl. Mandh. (1939) 390, non Makino.—Ic.: Kom. and Alis. l.c. Plate 274, fig. 3; Poyarkova, l.c. fig. 1.

Perennial. Plant with creeping rhizomes. Stem erect, 20–70 cm tall, simple or sometimes branched at base with 2–4 identical branches, straight or rarely flexuous, glabrous or sparsely hairy in upper part. Leaves all opposite or sometimes alternate in lower part of stem, thin (but not chartaceous when dry), sparsely puberulent on both surfaces, ciliate along margin, 4–8 cm long and 2.3–6 cm broad, broadly or rhombically ovate, short- or somewhat long-acuminate, with oblique, rounded-cuneate or broadly cuneate, decurrent base; in upper part with 1–2(3) pairs of large, lobate, acute or obtuse, often asymmetric teeth, rarely with broadly sinuate margins or entire; upper leaves often narrower, oblong-ovate, long acuminate; 66 petiole  $1/5$ – $1/3$ ( $2/5$ ) as long as lamina, in upper leaves up to  $2/13$  of lamina. Pedicels glabrous, erect in flower, 8–18 mm long, drooping in fruit, 2.4–3.2 cm long. Calyx 6–8 mm long, broadly campanulate, with narrowly triangular teeth as long as tube or a little shorter, on outside not very densely or even sparsely pubescent, hairs thick, antrorse, sometimes partly patent on tube, tooth margins densely finely ciliate. Corolla white, 1.7–2.2 cm across, with acute, broadly triangular lobes, sometimes orbicular at base and with ciliate margins, on outside puberulent. Fruit stalk ( $7\frac{1}{2}$  –  $1\frac{7}{10}$  times as short as)– $2/3$  as long as fruiting calyx. Berry 1.7–2 cm in diameter, orange, glossy, glabrous, enclosed within bright orange, glabrous, ovoid, (3)3.5–4.5(5) cm long calyx, gradually tapering toward apex. Seeds whitish or light yellow, finely reticulate-rugose, about 2 mm long, 1.8 mm broad. Flowering from June to first half of September. Fruiting from August to September.

Along river valleys in thickets of scrub, rarely in open forests, isolated or sometimes in groups, also as weed near villages, roads, and orchards. *Soviet Far East*: Ussuri (southern region). *General distribution*: Korea, China (southern Manchuria, A-la Shan, provinces of Hopeh and Shantung). Described from environs of the village of Prokhory in the southern part of the Ussuri Region. Type in Leningrad.



*Economic importance.* According to V.L. Komarov, the berries, though not particularly pleasant in taste, are used by the local population in food. Sometimes grown as an ornamental.

*Note.* 1. *P. glabripes* is easily distinguished from *P. alkekengi* by its pedicels, glabrous from the very first (and not densely pilose; persistently so until end of vegetative stage), with calyx very sparsely pubescent during flowering, in fruit ovoid, gradually tapering toward apex (and not globose with teeth sharply converging toward apex), completely glabrous (and not pilose over entire surface), and also by the different leaf shape and dentation. By the shape and dentation of leaves, shape of fruiting calyx, and absence of pubescence on it and pedicel, *P. glabripes* closely resembles Japanese *P. franchetii* Mast. (cultivated in the USSR in Caucasus); however, it is a much larger plant with larger parts: leaves, calyx (in flowers up to 10 mm long, in fruit up to 7 cm), berry, and also broader glossy leaves.

2. Kitagawa (l.c.) has identified the Manchurian *Physalis*, similar to the Southern Ussurian variety, with *P. franchetii* var. *bunyardii* Mak. The latter is a Japanese plant with parts similar in size to *P. longipes* but sharply differing from it by its dichromatic, narrow, long acuminate leaves and obviously is correctly recognized as the separate species *P. bunyardii* Mak.

67 3. *P. praetermissa* Pojark. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XVI (1954) 322.—*P. alkekengi* auct. fl. turkest.; O. and B. Fedtsch. Perech. rast. Turkest. 5, 74 (excl. pl. turcom.).

Perennial. Plant with creeping woody rhizomes. Stem 25–90 cm tall, erect, somewhat angular-sinuate, glabrous or sparsely hairy in upper part, usually simple, very rarely with a few branches. Leaves all opposite (rarely alternate in lower half of stem) thin, often chartaceous in dry form, sparsely hairy on both surfaces (densely so along ribs) or completely glabrous, 3.5–11 cm long and (2.5)3–7 cm broad, usually ovate, rarely elliptical-ovate or broadly ovate, upper sometimes oblong-ovate, short- or somewhat long-acuminate, with rounded-cuneate or cuneate base, often oblique and decurrent, most leaves entire or a few with 1–2(3) large, acute or very obscure teeth on each side and ciliate margin; petioles in lower leaves 1/5–2/5 as long and in upper leaves (1/6)2/11–1/4 as long as lamina. Pedicels in flowers 9–13 mm long, glabrous or sometimes sparsely hairy. Calyx 5–6 mm long, with triangular or narrowly triangular teeth (1/3)2/5–2/3 as long as tube, campanulate, sparsely pubescent outside with appressed antrorse hairs, partly somewhat patent on tube, teeth densely ciliate along margin. Corolla (whitish), 1.7–2 cm across, sparsely puberulent outside, with short broadly triangular lobes, not separated at base by sinuses and not rounded. Fruit stalk glabrous or sparsely hairy 1.5–3.5(4.5) cm long, 2/5–2/3 as long as fruiting calyx, latter bright orange, glabrous or sometimes very sparsely hairy, ovoid, gradually tapering toward apex,

(3.7)4–5(5.8) cm long. Berry orange-red, glabrous, glossy, 1.4–1.7(2) cm in diameter. Seeds yellow or orange, 2–2.5 mm long and about 2 mm broad, flat, rounded-reniform, finely reticulate-rugose. Flowering from (May) June to August. Fruiting from second half of June to September (Plate III, Fig. 2).

Plant mainly a ruderal weed growing near village settlements, along irrigation canals, in orchards, gardens and around plowed fields. Grows in the Hissar Mountain Range, also in walnut and mixed maple-walnut forests, to an altitude of 1600 m. *Soviet Central Asia*: Balkhash Region (southern part) Dzh.-Tarbagatai, (Dzhungar Ala-Tau), Kyzyl Kum (in oases), Kara Kum (Novo Urgench, introduced), Syr Darya, Tien Shan (northern region), Pamiro-Alai (except Pamir). *General distribution*: Dzh.-Kashgar (Kuldzha Region), China (North and Central). Described from Kazakhstan from Dzhyunke Valley in Bien-Aksuisk Region (Balkhash). Type in Leningrad.

*Note*. 1. The species resembles closely *P. glabripes* but, is distinguished from it by a combination of characteristics, some of which are not always sharply distinct and in individual parts are 'overlapped' by characteristics of *P. glabripes*. It should be added to the distinctive features indicated in the key that in *P. praetermissa* the lobes of the corolla are not separated by sinuses and are not rounded at the base (as is characteristic of *P. glabripes*), the leaves are long acuminate, all or most of them are entire and larger in size (medium and largest), and the plant itself is much larger.

2. It may be assumed that the spread of *P. praetermissa* Pojark. in Soviet Central Asia is due to its introduction during a distant past from China (across Hsin-hsiang?), where species of *Physalis* of the section *Megista* are grown as ornamental and fruit plants. Specimens in materials from Central and North China are identical to *P. praetermissa*.

Section 2. *Euphysalis* Rydb. in Mém. Torr. Bot. Club, IV, 5 (1896) 319.—Corolla yellow, often with violet or purple throat or with spots, shortly infundibuliform or campanulate, with slightly lobed or barely perceptible angular limb. Calyx in fruit green, yellowish, or brown, often with prominent thick veins. Endocarp without grit cells.

This section includes nearly 100 species, apart from a few American ones.

\**P. ixocarpa* Brot. ex Hornem. Hort. hafn. Suppl. (1819) 26.—*P. aequata* Jacq. f. ex Nees in Linnaea, VI (1831) 470; Dun. in DC. Prodr. XIII, 1, 447; Voznachn. rosl. UkrSSR, 369.—*lc.*: Gleas. New Britt. and Brown. Illustr. Fl. N.-Am. St. ed. 3, III 197.

Annual. Stem profusely branched, 50–120 cm tall, glabrous or patently hairy at young stage. Leaves 3–6 cm long, ovate or oblong-ovate, usually with extremely oblique base, long acuminate or with mucro at tip, with sinuate, coarsely and sharply dentate margin, rarely entire, glabrous or

hairy along ribs; petiole  $2/5-1/2$  as long as lamina, somewhat equaling lamina in leaves at base of branches. Pedicels 2–5 mm long, pubescent, 0.5–1 cm long in fruit. Calyx broadly campanulate, with triangular lobes as long as tube, sparsely appressed hairy outside, mainly along its 10 veins. Corolla bright yellow with violet throat, shortly infundibuliform, with broad angular limb 1–1.5 cm across. Anthers violet. Calyx in fruit 3–3.5 cm long (in cultivated varieties even longer), membranous, ovoid-globose, often 10-angled, greenish with purple veins, rounded at base (not indented), with teeth, at first convergent at apex but separating later due  
 69 to berry expanding and stretching calyx, often tearing it at apex. Berry 1–2 cm, in cultivated varieties up to 5 cm in diameter, light yellow, greenish or dark violet. Flowering from June to October. Fruiting from August.

Cultivated and sometimes wild.—*European USSR*: Ladoga-Ilmen (Pushkin City), Upper Volga, Middle Dnieper, Upper Dnieper; *Caucasus*: western Ciscaucasia, western Transcaucasia, Talysh. *General distribution*: Mexico and southern states of North America; grown in almost all countries with warm or hot climate. Described from Mexico. Type not known.

*Economic importance*. This species of *Physalis* is the most widely cultivated in the USSR. Since its introduction into cultivation (1926), plant-breeding stations in the USSR have developed several varieties, marked by better cold resistance, improved flavor in fruits and higher yield. The fruits contain 6–10% dry matter, a significant quantity of sugars (up to 40–50% of the dry matter in ripe fruits and as much as 30% in unripe ones) in the form of sucrose, fructose, and glucose as well as acids, mainly tartaric, up to 7–12% when cultivated in the north (Pushkin City) and 2.46–3.54% in the south (Lenkoran), tannin 2.5–2.8%, a substantial quantity—5–9.22%—of pectins, and 7–28% of vitamin C (Alpatev and Gruner. *Meksikanskii fizalis, ego kul'tura i ispol'zovanie*, (Mexican *Physalis*, its cultivation and use 1947). The fruits are used fresh and baked for flavoring dishes, for pickling, marinades, and preparing a vegetable casserole ('caviar'). When processed with sugar, they are used in various confectionery products: candied fruit, marmalades, syrups, jam, jelly and candy stuffing.

Sometimes, the morphologically similar species *P. angulata* L. (Brazil, Central America, and southern States of North America) found in cultivation (the Ukraine, Caucasus) is distinguished from *P. ixocarpa* by its narrower calyx lobes, corolla without dark-colored spots in the throat and longer, acuminate teeth on leaves.

\**P. pubescens* L. Sp. pl. (1753) 183; Rydb. in Mém. Torr. Bot. Club, IV, 5, 322; Kom. and Alis. Opred. rast. Dalnevost. kr. II, 912.—*P. ramosa* Mill. Gard. Dict. ed. 8 (1768) No. 9.—*P. hirsuta* Dun. in DC. Prodr. XIII, 1 (1852) 445, non Mart. and Gal.—*Alkekengi procumbens* Moench, Meth.



pl. (1794) 473.— *Ic.*: Gleas. New Britt. and Brown. Illustr. Fl. N.-Am. St. ed. 3, III, 195.

Annual. Stem profusely branched, branches divaricate; stem and branches somewhat violet, from densely pubescent to subglabrous. Leaves thin, 2.5–7(10) cm long, 1.2–6(8) cm broad, ovate, usually with oblique sinuate base, acute or acuminate, irregularly sinuate-dentate teeth or rarely entire, usually densely white-villous, rarely only along ribs; petiole 1/3–1/2 as long as lamina. Pedicel short, 3–5 mm long, up to 10 mm in fruit. Calyx campanulate, with lanceolate teeth, densely patently villous (as also pedicels). Corolla 6–10 mm across, shortly infundibuliform with broad slightly angular limb, light yellow with purple spots in center. Stamens with purple anthers. Fruiting calyx 2–3 cm long, membranous, yellowish green, pubescent, conical, with 5 prominent veins, teeth converging at apex, deeply indented at base. Berry 10–15 (in cultivated forms up to 20) mm in diameter, yellow, green, or violet, sweet with a strawberry aroma. Raw berry with weak *Solanum* flavor. Seeds brownish. Flowering from June. Fruiting from first half of July to September.

Cultivated.—*European USSR*: Middle Dnieper, Upper Dnieper, Black Sea Region; *Caucasus*: Ciscaucasia (western region); western Transcaucasia; *Soviet Far East*: introduced: Ussuri (southern region). *General distribution*: South America, Mexico, North America (southern states). Described from tropical countries ('India'). Type in London.

*Economic importance*. Cultivation of this species has been taken up in the southern regions of the USSR. In the Ukraine, new high-yielding (up to 10–12 t of ripe fruit per hectare) and early maturing varieties have been developed. The fruits are used in making high-quality jam, candied fruit, stuffings, liqueurs, etc. Dry fruits contain: sucrose 13.9%, invert sugars 16.5%, acids 1.1%, and a substantial quantity of vitamin C (Levitin: in Nauchn. tr. Ukr. n.-i. inst. ovoshchev. II, 1950, 59, 65).

\**P. peruviana* L. Sp. pl. ed. 2 (1762) 1670; Dun. in DC. Prodr. XIII, 1440; Rydb. in Mem. Torr. Bot. Club, IV, 5, 346; Grossh. Opred. rast. Kavk. 297; Dumbadze in Fl. Gruz. VII, 460.—*P. esculenta* Salisb. Prodr. (1796) 132.—*P. pubescens* R. Br. Prodr. fl. Nov. Holl. I (1810) 447, non L.—*P. edulis* Sims in Bot. Mag. (1807) ad tab. 1068.—*Alkekengi pubescens* Moench, Meth. pl. (1794) 473.— *Ic.*: Glaes. New Britt. and Brown, Illustr. Fl. N.-Amer. St. ed. 3, III, 194.

Perennial. Plant large, up to 1 m tall, with creeping rootstock. Stem erect, angularly flexuous, simple or slightly branched, densely patently puberulent. Leaves densely canescent-tomentose on both surfaces, 6–15 cm long and 4–10 cm broad, ovate-cordate, with rather long mucro at apex, entire or sinuate along margin, or sinuate-dentate with a few acute teeth; petioles 1/3–1/2 as long as lamina. Flowers on 9–13 mm long pedicels not

elongated in fruit. Calyx campanulate, 7–9 mm long, with lanceolate teeth, like pedicels densely patently pubescent, especially on tube. Corolla about 2 cm across, dull yellow, with 5 large violet spots in center and slightly angular limb. Stamens with violet anthers. Fruiting calyx 3.5–4.5 cm long, 71 greenish, pubescent, subglobose, with teeth converging at apex; fruit stalk much shorter than calyx. Berry 10–15 mm in diameter, yellow, sour-sweet, aromatic. Flowering from June to July. Fruiting from August to September.

Cultivated, sometimes growing wild.—*European USSR*: Middle Dnieper; *Caucasus*: western Transcaucasia. *General distribution*: South America (Peru, Bolivia). Widely cultivated in almost all countries with tropical or warm climate: in southern parts of North America, in India, Africa, Japan, Australia, and also in Southern and Central Europe. Naturalizing readily. Described from Lima in Peru. Type in London.

*Economic importance*: Cultivation of this berry is new in our country and valuable because of the excellent quality of the fruits, which can be used in food raw, dried (in stews and pies) and candied form, and also in making jam, candy stuffing, marmalade, and wine. It can be grown in the southern regions of the USSR: in the Ukraine (where it has already been tested), Moldavia, Crimea, Caucasus, and Soviet Central Asia.

Tribe 2. ATROPEAE Rchb. in Mössl. Handb. I (1827) XXXIX; Baehni in Candollea, X, 480.—*Atropinae* Miers, Illustr. S. Amer. pl. 1, Appendix (1846–1850) 164; Dun. in DC. Prodr. XIII, 1, 5, p.p. (Incl.: Lycineae, p.p., Datureae, p.p., Hyoscyameae, p.p., Nicotianeae, p.p., and Fabianeae, p.p.).—Corolla regular or irregular, imbricate in bud, stamens usually 5(4); fruit succulent or dry berry, capsule, rarely a drupe; embryo generally straight, rarely curved.

*Subtribe* 1. ATROPINAE Dun. in DC. Prodr. XIII, 1 (1852) 5 (Atropineae).—*Atropeae* Miers, Illustr. S. Amer. pl. I, Appendix (1846–1850) 166. p.p.; Baehni in Candollea, X, 480.—*Lyciinae* Wettst. in Pflanzenfam. IV, 3b (1895) 11, p.p.—Corolla tubular or campanulate; berry indehiscent; embryo hemispherical, strongly arcuate or spiral, with cylindrical cotyledons, rarely exceeding radicle in width.

### Genus 1314. *ATROPA*<sup>1</sup> L.

L. Sp. pl. (1753) 181.—*Belladonna* Adans. Fam. II (1763) 219.

Calyx 5-partite, slightly accrescent in fruit. Corolla tubular-campanulate with short 5-lobed limb. Stamens with curved filaments,

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<sup>1</sup> Named after *Atropos* (from the Greek: *a*—negation 'no' or 'not' and *trepein*—to turn, (direct), one of the three Parcae (Fates) who, according to Greek mythology, cut the thread of human life. The name indicates the extreme toxicity of the plant.



inserted at base of corolla, more or less equal to it in length. Fruit a bilocular succulent berry with numerous small, flat, pitted seeds. Tall perennial herbs with entire leaves and large solitary flowers.

- 72 Oligotypic genus: *A. belladonna* L.—in Europe and the Crimea, *A. baetica* Willk.—in Spain. *A. komarovii*—in Kopet-Dag and mostly in northern Iran and *A. acuminata*—in the Himalayas and the Hindu Kush.

1. Leaves narrow, oblong or linear-lanceolate, long-acuminate, pedicels glabrous, flowers and fruits yellow ... 3. *A. komarovii* Blin and Schal.
- + Leaves broader, ovate to lanceolate, acute or short-acuminate, pedicels glandular-pubescent. Flowers brownish violet-reddish or dull violet; berry black (there are yellow-flowered forms with yellow berries) ... 2
2. Flowers dull brown-violet-reddish to dark violet; stem in upper part (below inflorescence) usually densely glandular-pubescent, rarely diffusely glandular, not glaucous ... 1. *A. belladonna* L.
- + Flowers slightly pigmented, brownish or violet-reddish; wholly glabrous (rarely diffusely glandular), glaucous ... 2. *A. caucasica* Kreyer.

1. *A. belladonna* L. Sp. pl. (1753) 181; M.B. Fl. taur.-cauc. I, 164; Ldb. Fl. Ross. III, 190, p.p. (quoad pl. taur.); Dun. in DC. Prodr. XIII, 1, 464; Schmalh. Fl. II, 251 (excl. area asiat.).—*A. paschkewiczii* Kreyer, Result. shestiletn. nablyud. (1925) 35.—*l.c.*: Rchb. Ic. fl. Germ. XX, tab. 8 (MDCXXXIX) fig. 1–10; Fedtsch. and Fler. Fl. Evrop. Ross. fig. 765; Voznachn. rosl. URSR, fig. 221; Hegi, Illustr. Fl. Mittel-Eur. V, 4, tab. 231, f. 3; f. 3382, 3399, 3434; Javorka, Iconogr. fl. Hung., f. 3212. *Belladonna*.

- Perennial. Rootstock thick, cylindrical, branched, multiheaded at top. Stems 0.5–1.5(2) m tall, branched, green or somewhat dull purple-violet, not glaucous, in upper part, especially below inflorescence, usually densely, rarely diffusely, glandular-pubescent. Lower leaves alternate, upper sessile, opposite, dissimilar (one of them much larger than other), bright or dark green, somewhat densely covered with very minute (seen under magnifying glass!) sessile glands, sparsely puberulent along veins, ovate, oblong-ovate, or elliptical, acuminate or rarely acute, more or less decurrent on short petioles; larger leaves up to 15(22) cm long and 8(11) cm broad, smaller ones up to 7 cm long and 3.5 cm broad. Flowers solitary, nodding, on glandular-pubescent pedicels, apparently axillary. Calyx parted for about 2/3 length into 5 ovate or oblong-ovate
- 73 long-acuminate lobes, stellately patulous in fruit, glandular-puberulent, densely so on inner side. Corolla 20–33 mm long and 12–18(20) mm across at throat, on outside dull violet-reddish to dull dark purple, inside dull brownish or yellow, with violet ribs, rarely corolla yellow

(f. *lutea* Döll., *A. paschkewiczii* Kreyer); lobes broad, triangular-ovate, obtuse or subacute, slightly recurved. Filaments pubescent in lower part, anthers large, round, yellowish. Style filiform, with greenish bifid stigma. Berry slightly compressed, initially green, later black (in yellow-flowered form, yellow), shining, about size of cherry, with violet juice. Seeds numerous, reniform or slightly angular, brown, 1.5–2 mm long, 1.2–1.8 mm broad. Flowering from June to August. Fruiting from July to September.

Mainly in mountains, in broad leaved (especially beech) and fir forests, forest cleanings, glades, felling areas, forest edges, in bushy thickets in wet, friable humus-rich soil.—*European USSR*: Upper Dniester, Crimea. Cultivated over whole Ukraine and Baltic Region, in the north up to Leningrad. *General distribution*: Central and Atlantic Coast of Europe, Mediterranean Region, Balkan States-Asia Minor. Described from Europe (Austria and England). Type in London.

*Economic importance*: A highly poisonous plant, all parts of which contain highly poisonous alkaloids. It is one of the most valuable medicinal plants by virtue of its atropine and hyoscyamine content. These alkaloids are evenly distributed in the plant; hyoscyamine ( $C_{17}H_{23}NO_3$ ) is predominant, and easily converted into atropine by chemical treatment; the total alkaloid content usually varies between 4 to 6% and more, and varies considerably, depending on the age of the plant, the vegetative stage, conditions of habitat, light exposure, mineral nutrition, soil moisture, etc. The alkaloid content in forms with yellow flowers and fruits (variously described as var. *lutea* Döll, Fl. Grossherz. Baden, 1859, II, 771; var. *flava* Pater in Pharmazeut. Post. 1916; *A. paschkewizii* Kreyer, l.c.) as a rule, is much lower—less than 3%. In belladonna, many other substances are also found; asparagine, choline, apoatropine (only in roots), glucoside scopoline (methyl esculin), succinic acid, and magnesium salts of organic acids. Mainly the dried leaves (folia Belladonnae) and rarely the roots and seeds are used in pharmacopeia.

2. *A. caucasica* Kreyer, Result. shestiletn. nabl. (1925) 48; Grossh. Fl. Kavk. III, 352; Dumbadze, in Fl. Gruz., VII, 451.—*A. belladonna* auct. fl. cauc.: C.A.M. Verz. Pflanz. Cauc. Casp. Meer (1831) 113; Ldb. Fl. Ross. III, 190, p.p. (quoad. pl. cauc.), non L.—*l.c.*: Kreyer, l.c. fig. 73; Fl. Gruz. III, fig. 337.

74 Perennial. Closely resembling aforementioned species, distinguished by following features: stem usually completely glabrous along entire length (including inflorescence) generally glaucous (occasionally diffusely glandular-pubescent below inflorescence); leaf veins usually glabrous; flowers on average larger and, according to Kreyer, with broader throat and lighter color: brownish or violet-red in upper part, with yellow pattern in lower part. Flowering from second half of May to first

half of September. Fruiting from second half of June to first half of October.

In mountain forests of lower and middle zones, mainly beeches, on northern and northeastern slopes, in clearings and moist glades, along windbreaks, forest edges, in friable humus-rich soils.—*Caucasus*: Ciscaucasia (western and central regions), western, southern, and eastern Transcaucasia, Talysh. *General distribution*: Balkan States-Asia Minor, Armenia-Kurdistan, ? Iran (northwestern region). Described from plants grown from seeds obtained from Sukhumi and Tbilisi. Type lost?

*Note*. The specific independence of the Caucasian belladonna has to be further confirmed since it is not always possible (in the herbarium) to distinguish it from *A. belladonna* L. However, the unconditional merger of *A. caucasica* and *A. belladonna* into a single species would be a step backward in the study of races of the polymorphic species, *A. belladonna*. In spite of the absence (or nonappearance) of constant distinctive features, the Caucasian race of belladonna reveals a high constancy of features very rarely observed in European and Crimean plants: an absence of pubescence on the upper part of the stem and lighter color of flowers; even physiological differences have been observed (Zolotnitskaja, Gasparjan, and Davtjan, 1949), as for example, a 3–5 times as long seed-germination period for Caucasian belladonna. A thorough comparative study of plants of both races under natural conditions and a comparative study of their physiological and chemical properties should be continued.

*Economic importance*: The same as that of the preceding species.

3. *A. komarovii* Blin. and Shal. in Izv. Turkm. fil. Akad. Nauk SSSR, 3–4 (1945) 183.—*A. lutescens* Blinovskiy and Shalyt in Tr. Turkm. fil. Akad. Nauk SSSR, V (1944) 260, fig. 1, non Jacq.

Perennial. Rootstock multicapitate, branched, woody. Stems 1–1.5 m, tall, erect, branched in upper part, glabrous, sometimes glaucous, smooth, not angular. Leaves up to 20 cm long, 7 cm broad; lower leaves alternate, others opposite, with one 1/3–2/5 size of others, thin in dry form; both surfaces with extremely minute (seen under magnifying glass) sessile glands, dense underneath, scaly when dry without simple hairs, lighter underneath, oblong-ovate often lanceolate or narrowly elliptical, long-acuminate, with cordate base, decurrent on petiole 1/5–1/7 as long as lamina. Flowers 75 solitary with glabrous, 2–3.5 cm long pedicels. Calyx short-glandular, with oblong, ovate-deltoid, acuminate lobes. Corolla yellow, up to 2.5 cm long, with rounded lobes. Filaments glabrous, with thickened base. Berry globose or slightly flattened, black tinged with blue, shining, with numerous dark brown, fine, about 1.8 mm long, 1.2–1.3 mm broad reniform seeds.

Bottom of ravines, under shady trees in moist soil.—*Soviet Central Asia*: mountainous Turkmenia (western Kopet-Dag). Endemic? Described



from Khozly' Ravine in western Kopet-Dag (solitary occurrence). Type in Leningrad.

*Economic importance:* The chemical and pharmacological properties of this species have not been studied. The closely similar Himalayan species *A. acuminata* Royle is found to have a high percentage of active alkaloids (Ind. Journ. of Pharm. XIII, 11 [1951] 249).

### Genus 1315 *MANDRAGORA*<sup>1, 2</sup> L.

L. Sp. pl. (1753) 181; Benth. and Hook Gen. pl. II (1876) 900.

Calyx herbaceous, almost leaflike, 5(6)-lobed, accrescent in fruit. Corolla campanulate, 5(6)-lobed to about half length, plicate between lobes. Stamens 5(6), inserted below middle of corolla tube and included; filaments filiform; anthers oblong, with almost parallel sacs. Ovary bilocular; style filiform; stigma capitate, slightly bifid. Fruit pulpy, succulent, many seeded, fine-skinned berry. Perennial herbs, almost always acaulescent with thick, peculiarly branched root and large leaves crowded into basal rosette.

The genus includes 5–6 species, distributed in the Mediterranean Region from the Pyrenees in the west to the Near East and the Himalayas in the east; one species is known in the USSR.

1. *M. turcomanica* Mizgir. in Tr. Turkm. AN SSSR, II (1942) 165.—*lc.*: Mizgireva, l.c. fig. 1, 2.

Perennial. Leaves spreading over ground in large rosette up to 160 cm in diameter; lower leaves up to 80 cm long and 60 cm broad, broadly elliptical or ovate, in upper half usually with large, irregularly triangular teeth up to 2 cm long; upper leaves smaller, oblong-ovate or broadly lanceolate, usually without large teeth, both with crispate margins, upper surface papillose-rugose, both surfaces subglabrous, lower surface usually very sparsely hairy 76 along ribs, hairs more numerous on young leaves. Flowers 1–3 in leaf axils, on slender sparsely pubescent, (0.5)2–3 cm long pedicels elongated up to 7–18 cm in fruit. Calyx 15–20 mm long, with ovate- or triangular-lanceolate sparsely pubescent lobes 10–15 mm long and 5–8 mm broad, with acuminate apex, accrescent and enclosing fruit up to 3/4 of its length or completely. Corolla violet, base with 3 white stripes reaching half its length, sparsely pubescent outside, 20–25 mm long, with slightly recurved, broadly ovate, subobtusate lobes about 15 mm long and 10–15 mm broad. Stamens about 10 mm long, filaments about 7 mm long, densely white tomentose at base; anthers about 4 mm long, pale blue. Style longer than stamens; stigma green. Berry globose, up to 6 cm in diameter, smooth, glossy, orange-yellow

<sup>1</sup> Treatment by I.A. Linczevsky.

<sup>2</sup> From the Greek *Mandragoras*—name of the plant given by ancient authors.



when ripe. Seeds reniform, flat, 4–5 mm long and 6–7 mm broad, yellow or light brown. Flowering from November to April. Fruiting from May to June.

On stony and rubbly slopes with thickets of *Paliurus spina-christi* Mill. and along dry river beds in mountain valleys at an altitude of about 500–700 m.—*Soviet Central Asia*: mountainous Turkmenia (western Kopet-Dag, southern foothills of the Syunt and Chokhagach mountains, in the localities of Shevlan, Shepli, Altybai, Ekechinar, Dagdanly, Sarymsakly, and Keriz). *General distribution*: Iran? Described from Shevlan in the southern foothills of Mt. Syunt. Type in Leningrad, isotype in Ashkhabad.

*Note*. Easily distinguished from related species by the following features: from *M. officinarum* L. by the violet (and not greenish white) corolla, pale blue (and not pale yellow) anthers, larger calyx only slightly shorter than (and not 1/3–2/5) corolla, berry almost twice as large; from *M. autumnalis* Spreng.—by the form and much larger size of leaves and fruits, color of anthers, larger calyx, etc.

The plant is exceptionally interesting as regards its biology; its vegetative period extends from autumn to early summer, interrupted only during the driest and hottest periods of the year: the leafy rosette develops with the beginning of the rainy season; flowering and fruit formation extends from early November to mid-April; fruits ripen from May to July, and leaves start withering in the first half of June. The plant is capable of vegetative reproduction, having numerous underground buds on its root.

*Economic importance*: The species of mandragora (evidently *M. officinarum* L. and *M. autumnalis* Spreng.) are known from ancient times as plants possessing so-called magical powers and providing happiness. The most valuable, according to the mystical superstitions of those times, was considered to be the mandrake root, the wonderful branching of which often gives it the appearance of male or female human figures. Pulling the mandrake root out of the ground was accompanied by a  
77 peculiar ritual. The 'cult' of mandrake was widely prevalent in the countries of southeastern Europe and the Near East. It is also known that in ancient times and during the Middle Ages mandrake was used in medicine as an anesthetic. According to Wehmer [Wehmer, *Die Pflanzenstoffe*, 2 Aufl. II (1931) 1106] the presence of the following alkaloids has been established in *M. autumnalis*: hyoscyamine, scopolamine, atropine, scopoletin, and mandragorin; *M. officinarum* contains hyoscyamine and pseudo-hyoscyamine.

*M. turcomanica* has not yet been studied for an assessment of its alkaloid content, but according to information supplied by Mizgireva (l.c., p. 169) it is used by local Turkmen population as a medicinal plant.

# Genus 1316. *LYCIUM*<sup>1</sup> L.

L. Sp. pl. (1753) 191

Calyx dentate or 2–3-lobed, not accrescent. Corolla tubular-infundibuliform or almost infundibuliform, with regular, flat, lobed limb and cylindrical or conical tube. Stamens included, alternating with corolla lobes, anthers dehiscing by longitudinal slit. Pistil with filiform style. Fruit bilocular, many-seeded, succulent berry. Shrubs usually armed, with entire, alternate or clustered leaves.

The genus includes 80–90 species, distributed everywhere except in tropical regions of the globe, the highest number being found in South America.

1. Fruits black; leaves thick, fleshy, subcylindrical; branches densely armed with short 3–20 mm long, leafless, slender spine♀. *L. ruthenicum* Murr.
- + Fruits red; leaves slightly fleshy or thinner herbaceous; plant unarmed or poorly armed spines thicker, generally longer, and almost all of them bearing clusters of leaves and flowers ..... 2
2. Filaments densely pubescent with tufts of long hairs forming joint at base; corolla tube short, equaling limb or slightly longer or shorter, cylindrical only at base, sharply broadened above ..... 3
- + Filaments glabrous or puberulent near base in front and on sides, and glabrous at back; corolla tube 1.5–2.5(3) times length of limb ..... 4
- 78 3. Corolla tube equaling limb or little shorter, lobes narrowed toward base, without auricles, deflexed; leaves ovate-lanceolate or lanceolate, with short broad or narrow cuneate base; branches extremely flexuous ....  
..... 3. *L. flexicaule* Pojark.
- + Corolla tube distinctly longer than limb, lobes with auricles at base, extended; leaves oblanceolate, elliptical-lanceolate or oblong, narrowed into long narrow base; branches straight or slightly flexuous .....  
..... \**L. barbarum* L.
4. Lower part of filaments and inner side of corolla at same level, puberulent; berry many (10–22) seeded, seeds small, 1.5–2 mm long .....  
..... 4. *L. dasystemum* Pojark.
- + Filaments and inner side of corolla glabrous, seeds (2)5–15 in number, larger, 2–3 mm long ..... 5
5. Corolla tube gradually broadened upward, infundibuliform, limb usually 5-partite; lobes sparsely ciliolate along margin; leaves 2–5(6) cm long, oblong-oblanceolate or narrowly spatulate, obtuse; flowers in fascicles

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<sup>1</sup> From the Greek *lykion*—name of some prickly shrub (? *Rhamnus*) given by Dioscorides; so named after the ancient district of Lycia in Asia Minor, the natural habitat of this shrub.

- along with leaves in buds of reduced conical shoots ..... 1. *L. turcomanicum* Turcz.  
 + Corolla tube cylindrical, sharply broadened near limb; lobes with dense white fringe of cilia along margin; leaves 2.5–10 cm long, narrowly elliptical or oblong-lanceolate, tapering toward apex, usually acuminate; flowers usually 1–2 in axils of upper leaves of elongated shoots ..... 5. *L. kopetdaghi* Pojark.

Series 1. *Orientalia* Pojark. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XIII (1950) 248.—Corolla infundibuliform, with tube cylindrical only at base and then gradually broadening upward; lobes of limb 2/5–2/3 as long as tube. Filaments glabrous. Berry red, globose; seeds 2–3 mm long. Flowers in fascicles along with leaves, only from buds of lateral reduced extra-axillary shoots.

This series includes 4 species distributed within the Mediterranean Region and the Middle East and Central Asia: *L. europaeum* L., *L. orientale* Miers, *L. turcomanicum* Turcz., and *L. depressum* Stocks.

1. *L. turcomanicum* Turcz. ex Miers in Ann. and Mag. Nat. Hist. ser. 2, XIV (1854) 183; Illustr. South Amer. Pl. II, 117; Turcz. in sched.; C.K. Schneid. Illustr. Handb. Laubholz. II, 610, p.p. (quoad pl. transcasp.); O. and B. Fedtsch. Perech. rast. Türkest. 5, 76, p.p.; Grossh. Fl. Kavk. III, 352, quoad. area, non descr.; Pojarkova in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XIII, 248.—*L. tataricum*  $\beta$ . *minus* Pall. Fl. Ross I, 1 (1784) 79; Ldb. Fl. Ross. III, 191.—*L. barbarum* auct. (non L.): Dun. in 79 DC. Prodr. XIII, 1 (1852) 511 (excl. syn.); Miers Ann. and Mag. Nat. Hist. sér. 2, XIV, 182, p.p. (excl. pl. e. Scinde); Illustr. South Amer. pl. II, 117; Boiss. Fl. or. IV, 289 (excl. syn.) O. and B. Fedtsch. l.c.—*L. turcomanicum filamentis basi glabris* Lipsky, Bot. eksp. v Zakasp. (1889) 15.—*l.c.*: Pall. l.c. tab. XLIX, f. A.; Miers, Illustr. South Amer. pl. II, tab. 69 D, E; Pojarkova, l.c. fig. 4.

Perennial. Strongly armed shrub, branched, glabrous, 1.5–2.5 m tall, with strong nodose branches, covered with gray or brownish, longitudinally fissured bark; young and one to two year-old shoots whitish, long, virgate, often flexuous with numerous strong 0.5–6 cm long spines, arising from nearly every axil, most of them bearing buds, developing leaves and flowers. Leaves developing from lateral, extremely reduced, ribbed, conical buds, and therefore in clusters of 2–5 each, while spines or lateral sharp prickly shoots nearly always develop from axillary buds; leaves very rarely solitary only on long shoots (dolichoblasts), alternate; petioles short, 1/6–1/2 as long as lamina; lamina light colored, glaucous, fleshy, 2–5(6) cm long, 0.2–0.8(1.5) cm broad, oblong-ob lanceolate, mostly obtuse, rarely subacute, very gradually narrowed into petiole. Flowers in clusters of



2–6 along with leaves on short lateral axillary shoots. Pedicels 4–12 mm long. Calyx broadly campanulate, with 5 (rarely 4–6) unequal teeth or 2–3-lobed; margin uniformly ciliate. Corolla pale violet, 9–13 mm long (often 10–12 mm), infundibuliform, gradually broadening upward, glabrous inside, with usually 5-partite (rarely 6-partite and very rarely 4-partite) limb; lobes  $1/2$ – $2/3$  as long as tube, ovate or oblong-ovate, spreading, margin sparsely ciliate or subglabrous. Stamens inserted little above middle of tube, subequal, with glabrous filaments slightly exerted. Fruits red, globose or ovoid-globose, 4–8 mm long, with (2)5–9 (up to 15) seeds. Seeds 2–3 mm long, 1.5–2 mm broad, reniform, brown. Flowering from April to May. Fruiting from May to July.

In clayey, rubbly, and sandy desert regions near mountains, mainly at the margins and in oases, often in saline habitats, less often on cliffs along river banks, dry river beds, in riverine forests and bushy thickets, occasionally in piedmont areas and low mountain zones along irrigation canals and edges of fields. *European USSR*: Lower Volga (one doubtful location between the mouths of the Volga and the Urals); *Caucasus*: Southern Transcaucasia (on the Araks River in the Megri District; *Soviet Central Asia*: Kyzyl Kum (southern section), Kara Kum (southern section), Amu Darya, Pamiro-Alai (southwestern section). *General distribution*: Iran (all regions). Described from Turkmenia. Type in London. Isotype in Leningrad.

80 *Note*. Closely similar to *L. turcomanicum* Turcz., judging from its diagnosis, is *L. depressum* Stocks [in Hooker's Journ. Bot. IV (1852) 179] from southern Baluchistan (the species is not known to the present author). If both these species are found to be identical, they should be combined under the older name, *L. depressum* Stocks.

Series 2. *Ruthenica* Pojark. Corolla tube cylindrical in lower part, gradually broadened above; lobes  $(1/3)2/5$ – $2/3$  as long as tube. Filaments somewhat densely puberulent at base (as also corolla tube at this level). Berry black, with brown seeds about 2 mm long. Leaves and flowers developing from buds on reduced lateral extra-axillary shoots; prickly shoots, leafy and leafless spines develop from axillary buds.

2. *L. ruthenicum* Murr. in Comment. Soc. sc. Gotting. II (1780) 9; M.B. Fl. taur.-cauc. I, 166, 423, III, 159; Ldb. Fl. Ross. III, 190; Miers in Ann. a. Mag. Nat. Hist. ser. 2, XIV, 184; Boiss. Fl. or. IV, 290; Schmalh. Fl. II, 251; O. and B. Fedtsch. Perech. rast. Turkest. 5, 75, p.p. (excl. var. *minus*); Grossh. Fl. Kavk. III, 351.—*L. tataricum* Pall. Fl. Ross. I, 1 (1784) 78; p.p. (excl.  $\beta$ . *minus*); Miers, l.c. 187.—*L. europaeum* Pall. Reise, III, 538, 553, non L.—*lc.*: Pall. Fl. Ross. I, 1, tab. XLIX; Miers, Illustr. South Amer. pl. II, tab. 70, f. A, C; Fedtsch. and Fler. Fl. Evrop. Ross. fig. 764.

Shrub. Strongly armed, branched, glabrous, 30–200 cm tall, with strong, yellowish white flexuous shoots, usually drooping only at apex,



densely covered with short subulate, 3–20 mm long spines (developing on all nodes), leafless and usually not forming buds; branches divaricate, nodose, yellowish or grayish, old ones ash-gray, bearing short leafless spines and numerous leafy sharp prickly shoots of varying length (from 1–2 cm). Leaves sessile, glaucous, fleshy, obscurely veined, usually obtuse, highly variable in shape, from narrow linear (most often), subcylindrical, to narrowly oblanceolate, 0.5–3.5 cm long, 0.75–3 mm broad, very gradually narrowed toward base, rarely oblanceolate or oblong-elliptical (f. *brevifolia* O. Kuntze), 0.6–1.8 cm long and 2–3.5(5.5) mm broad. Flowers on 4–8 mm long pedicels, solitary or rarely in clusters of 2(3) along with leaves from buds disposed singly or in pairs along both sides of base of spines or short prickly shoots, and on old branches from conical reduced shoots, covered with numerous scales left by buds of previous years. Calyx 2.5–4.5 mm long, narrowly campanulate, cleft into 2–3 unequal lobes, very rarely unequally 5-toothed, ciliate along margin. Corolla 8–13(15) mm long, tube whitish, narrowly cylindrical below, broadly infundibuliform above, limb  
 81 reddish, cleft into 5 (rarely 4 or 6) oblong-ovate lobes, glabrous along margin or rarely with a few glandular cilia,  $(1/3)2/5$ – $2/3$  as long as tube. Stamens included, unequal in length, filaments inserted in lower half of tube, somewhat broadened and densely tomentose at base. Fruits 4–8 mm in diameter, black, with numerous reniform and angular brown seeds 2 mm long and 1.5–1.8 mm broad. Flowering from second half of April to July. Fruiting from June to October.

In plain and mountain deserts and semideserts, especially in sandy and saline regions, in dry riverine valleys, and along irrigation canals.—*European USSR*: Lower Volga; *Caucasus*: eastern and southern Transcaucasia; *Soviet Central Asia*: Aral-Caspian Region, Balkhash Region, Kyzyl Kum, Kara Kum, Amu Darya, Syr Darya, Pamiro-Alai (northwestern and southern sections; in the east up to Darvaz, inclusive). *General distribution*: Armenia-Kurdistan, Iran, Dzh.-Kashgar, Mongolia, Tibet. Described from cultivated specimen grown from seeds sent by Pallas along with seeds of Siberian plants. Type not known.

*Series 3. Chinensia* Pojark. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XIII (1950) 254.—Corolla tube almost equaling limb, slightly broadened above, with hairy ring inside. Filaments densely pubescent with tufts of long hairs at base forming spherical or short cylindrical joint. Berry bright red, ovoid or oblong, with yellow seeds. Flowers and leaves from axillary buds of elongated shoots as well as from buds of lateral (extra-axillary) shoots.

Six species, of which five grow in eastern Asia, four in China (one of which has reached Japan), one in Cochin China (part of South Vietnam), and one in Soviet Central Asia.

3. *L. flexicaule* Pojark. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XIII (1950) 257, fig. 5.

Cultivated. Short, spreading, profusely branched, apparently a short shrub with upright or extended branches becoming very slender and drooping at tips, branches and shoots extremely flexuous, often zigzag, glabrous, longitudinally rugose, without or occasionally with very fine nerves, straw-colored or slightly brownish yellow, often producing numerous short, 0.7–4.5 cm, slender prickly shoots, mostly bearing leaves and flowers or very short shoots appearing like leafless spines. Leaves sometimes solitary from axillary buds, but more often in clusters from lateral reduced conical shoots, glaucous on lighter under surface with scarcely visible or obscure lateral veins, lanceolate or ovate-lanceolate, 82 tapering toward apex, with broad or narrowly cuneate base; up to 4.3–5 cm long and 2.2–2.8 cm broad on elongated shoots, 0.8–2.5 cm long and 2.5–6.8 mm broad on reduced shoots; petioles 1/10–1/4 as long as lamina. Flowers 1–2 in leaf axils, rarely in clusters along with leaves, on slender, up to 15–18(22) mm long pedicels. Calyx broadly campanulate, 3–3.5 mm long and as broad, with 2–3 large teeth, tomentose at apex. Corolla 9–11 mm long, broadly infundibuliform, with short tube equaling limb or little shorter, narrow at base, becoming cylindrical and then sharply broadened, inside with tomentose-pilose ring above insertion of stamens; limb 4–5-partite; lobes elongated, deflexed, narrowed toward base, without auricles, subacute or obtuse, with ciliolate margin. Stamens equaling corolla or some slightly exserted, filaments inserted in middle of tube and dense clusters of hairs a little above insertion. Style slightly longer than stamens, usually curved. Young fruit ovoid or oblong, apiculate, callous thickening at apex; ripe berry not known. Flowering from June to September.

On dry slopes, coastal cliffs, old fields, and in steppes.—*Soviet Central Asia*: Tien Shan (western bank of Issyk-Kul Lake and foothills of Kirgiz Ala-Tau). *General distribution*: Dhzh.-Kashgar (Kuldzha Region). Described from vicinity of the village of Kutemaldy on western bank of Issyk-Kul in Kirgizia. Type in Leningrad.

*Note*. Very closely related to *L. potaninii* Pojark, widely distributed in northern China, southern Mongolia, and Chinese Dzhungaria, from which it is distinguished, apart from leaf shape, by broader corolla lobes, longer than tube, shorter stamens and smooth or almost smooth (not ribbed) shoots.

\**L. barbarum* L. Sp. pl. (1753) 192 (excl. synonym.): Ldb. Fl. Ross. III, 190; Schmalh. Fl. II, 251; Grossh. Fl. Kavk. III, 351; Pojarkova in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XIII, 262.—*L. halimifolium* Mill. Gard. Dict. ed. 8 (1768) No. 6; C.K. Schn. Illustr. Handb. Laubholzk. II,

611.—*Jasminoides flaccida* Moench, Meth. pl. (1794) 470.—*L. urbinatum* Pior. in Duham. Traité d. arbres, ed. 2 (1801) 119.—*L. vulgare* Dun. in DC. Prodr. XIII, 1 (1852) 509; Miers in Ann. a. Mag. Nat. Hist. XIV, sér. 2 (1854) 185.—*L. subglobosum*  $\beta$ . *lanceolatum* and  $\gamma$ . *leptophyllum* Dun. l.c. 511.—*L. flacidum* C. Koch, Deutsch. Dendr. II, 1 (1872) 347.—*Id.*: Duham. l.c. tab. 31; Miers, Illustr. South Amer. pl. II, tab. 70, f. B; C.K. Schn. l.c. f. 396 a–f; Javorka, Iconogr. fl. Hung. f. 3210.

- 83 Cultivated. Profusely branched 1–2(2.5) m tall, with numerous, long, slender, light yellow shoots with drooping tips, usually unarmed, rarely with short 6–15 mm long, slender, usually leafless axillary spines. Leaves alternate only on terminal shoots, others in clusters of a few from buds of reduced, extra-axillary or axillary shoots, upper surface green, lower glaucescent, somewhat fleshy, with inconspicuous lateral veins, narrowly oblanceolate, elliptical-lanceolate or narrowly elliptical, obtuse, acute or acuminate; base narrowly cuneate, gradually passing into petiole; lamina 2–3 cm long, 2.5–8 mm broad, reaching 6 cm in length and 1.5(3) cm in breadth, and usually lanceolate on long shoots in cultivated plants; petiole 1/5–2/7 as long as lamina. Flowers on reduced shoots in fascicles of 2–6, one or two on long shoots from leaf axils. Pedicels 5–15 mm long, thickened above. Calyx 4–5 mm long, campanulate, usually incised to middle or further into 2 or 3 unequal lobes, rarely 4–5-toothed; margin of lobes usually smooth, tomentose only at tip. Corolla 11–13(15) mm long, infundibuliform, tube distinctly longer than limb, narrowly cylindrical in lower part, gradually broadly infundibuliform above, glabrous outside with pilose-tomentose ring above stamen insertion within; limb 5-partite, light pink or violent-pink with darker nerves and bases of lobes; lobes ovate, sharply narrowed toward base, often having auricles, with sparsely ciliate margin. Filaments inserted near middle of tube and with dense tufts of long hairs at base or little above, for 1–1.25 mm. Stamens 5, 2 or 3 equaling corolla, others little shorter. Style slightly longer than stamens. Berry red, oblong-ovoid or broadly ovoid, obtuse or apiculate, 8–18 mm long, 5–10 mm broad. Seeds brownish yellow, globose-reniform, 2.5–3 mm long, 2.25–2.5 mm broad. Flowering from June to September. Fruiting from July to October.

Cultivated for hedges and as an ornamental in southern regions, in some places in the steppes, often naturalized, forming thickets.—Cultivated. *European USSR*: almost all regions, except north; *Caucasus*: all regions; *Soviet Central Asia*: mountainous Turkmenia, Syr Darya (Tashkent oasis), Tien Shan and Pamiro-Alai (in cities). *General distribution*: Wild in Central China (Kansu Province), widely cultivated in Europe, the Mediterranean Region, northern Africa, and North America. Described from a cultivated European specimen. Type lost.



*Note.* Besides the typical form (corresponding to *L. turbinatum* Poir.) there is a closely related form of doubtful taxonomic status known as *L. barbarum* var. *lanceolatum* (Poir.) C.K. Schn. (*L. lanceolatum* Poir.), with the doubtful claim of Poiret that it grows wild in the Mediterranean Region. It is distinguished from *L. barbarum* by acuminate, usually curved leaves and reddish flowers. Occasionally, *L. chinense* Mill.—(eastern China, Korea, Japan) is found in cultivation with decumbent shoots, broader leaves than *L. barbarum* and short tubular flowers and rarely *L. trewianum* Roem. and Schult. has been observed it is distinguished from *L. chinense* by straight, strong branches and bluish flowers.

*Series 4. Truncata* Pojark. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XIII (1950) 268.—Corolla tube narrow, cylindrical, abruptly broadened just below the limb; lobes 2/5–1/2 as long as tube, densely ciliate. Stamens inserted in upper part of tube, filaments glabrous or puberulent at base. Berry red. Leaves and flowers solitary from axillary buds of long shoots and also in clusters from buds of reduced lateral extra-axillary shoots.

This series includes 3 species: two from Soviet Central Asia and one from northern and central China.

4.*L. dasystemum* Pojark. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XIII (1950) 270.—*L. turcomanicum* auct.: Boiss. Fl. or. IV (1879) 290; C.K. Schn. Illustr. Handb. Laubholzk. II, 610, p.p. (quoad. pl. songor.); O. and B. Fedtsch. Perech. rast. Turkest. 5, 76, p.p.; non Turcz. ex Miers. (1854)—*L. barbarum* auct.: O. and B. Fedtsch. l.c. p.p. non *L. Ic.*: Pojark. l.c. fig. 7.

Cultivated. Profusely branched, thorny up to 1.5 m tall, with strong, sometimes slightly sinuous branches, bark straw yellow or in older branches light gray, longitudinally fissured. Young shoots numerous, glabrous, slender, sometimes arcuate, whitish or light yellow, not prickly or sharply pointed at tip, a few reduced and modified into thorns; thorns strong, 0.5–6 cm long, leafless or bearing leaves and flowers. Leaves on long young shoots alternate, on old shoots in fascicles of 2–5 from buds of reduced shoots, extremely variable in shape and size: narrowly ovate to narrowly elliptical, obovate to narrowly obovate, and ovate-elliptical, 10 mm long and 3 mm broad (on reduced shoots) to 4–7.5 cm long and 1.5–2.2 cm broad, sometimes oblique or somewhat curved, acute or subacute, rarely acuminate or obtuse, light bluish gray and somewhat thick, with prominent veins (in herbarium); petiole glabrous, 1/9–1/3 as long as lamina. Flowers axillary in upper part of shoots, solitary or in pairs; on older branches in fascicles of 2–6 along with leaves from buds of reduced shoots. Pedicels (3)4–13 mm long, glabrous or diffusely pubescent mainly at base. Calyx campanulate,



3–4 mm long, with 2–3 long lobes or 4–5 toothed; teeth sparsely ciliate along margin and with white-tomentose tips. Corolla violet-blue (as indicated on labels) 8(9)–11(13) mm long, with narrow, subcylindrical tube, abruptly broadened below limb, and ring of short hairs inside above stamen insertion; limb and ring of short hairs inside above stamen insertion; limb half as long as tube, usually 5-partite, rarely 4 to 6-partite, lobes spreading, broad, ovate (1:1), obtuse, with auricles at base; margin rather densely ciliate. Stamens longer than corolla, inserted near middle of tube, subequal, with filaments pubescent anteriorly in lower part, anthers slightly exerted. Style as long as stamens, stigma capitate. Berry red, globose or ovoid-globose. Seeds 10–20, brown, small, 1.5–2 mm long, 1–1.75 mm broad, reniform, sometimes angular. Flowering from second half of April to August. Fruiting from May to September.

In steppes and deserts, mainly in saline habitats, sandy places, on pebble beds of dry rivers, in riverine forests, coastal shrubby thickets, on cliffs, dry slopes of mountains and foothills up to an altitude of 2500 m.—*Soviet Central Asia*: Aral-Caspian Region (eastern section), Balkhash (southern section), Dzh.-Tarbagatai (southern section), Kyzyl Kum, Amu Darya, Syr Darya, Pamiro-Alai (northern region), Tien Shan (central section). *General distribution*: Dzh.-Kashgar. Described from Bancha Kumy in southern Kazakhstan. Type in Leningrad.

*Note*. This species has not been differentiated from *L. turcomanicum* Turcz., though it is well distinguished from it by the form of the corolla; pubescent at the base of the filaments and small seeds and flowers mainly in leaf axils in upper part of long shoots.

*5.L. kopetdaghi* Pojark. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XIII (1950) 275, fig. 8.

Cultivated. Spreading 0.5–1(1.5) m tall, with numerous divaricate branches; bark gray, longitudinally fissured, sometimes unarmed or densely spiny, often nodose due to reduced (2–5 mm long) shoots situated laterally at base of axillary branches; young and 1–2-year-old shoots straw yellow, slender, sometimes arcuately recurved, often flexuous, young axillary shoots short, unarmed or sharply pointed, shortest 0.8–1.5 cm long, usually leafless and longer ones bearing leaves and flowers. Leaves partly alternate, partly on older branches apparently in fascicles (usually along with flowers), developing from tightly convoluted buds of extremely reduced (2–5 mm long) lateral shoots, narrowly elliptical or oblong-lanceolate, acuminate at apex, rarely obtuse, gradually narrowed into petiole  $(1/5)2/7$ – $1/2$  as long as lamina; lamina bright green, succulent but thin or, rarely, somewhat fleshy, with distinct lateral veins. Flowers mostly in fascicles of 2–3 on young shoots in upper leaf

86 axils, terminal inflorescence packed with 20–40 flowers due to arrested internodes; on old branches flowers develop from buds of reduced lateral shoots. Pedicels 3–8(15) mm long. Calyx campanulate, 3–4 mm long, 2–3 mm across, mostly 4(5)-toothed, rarely 2–3-partite, sparsely ciliate along margin; teeth white-tomentose at apex. Corolla 10–12(13) mm long, violet, with cylindrical tube, abruptly broadened in upper part, constricted a little above base, glabrous within and outside; limb usually 4-partite (rarely 5-partite) with ovate lobes, half as long as tube, with dense white fringe of short hairs along margin. Stamens alternating with corolla lobes, with glabrous filaments, inserted in middle of tube, subequal, slightly exserted. Style with capitate stigma equaling stamens. Berry red, about size of pea (6–8 mm in diameter), globose or ovoid-globose, with 6–14 brown 2–2.5 mm long and 1.25–1.75 mm broad reniform seeds. Flowering from May to July. Fruiting from June to September.

In foothill regions, mainly in shallow-soil steppe plateaus and slopes, also on rubbly and rocky slopes, and in ravine beds. *Soviet Central Asia*: mountainous Turkmenia (Kopet-Dag). *General distribution*: Iran (southern slope of Kopet-Dag and Elburz Mountains). Described from Kopet-Dag in the vicinity of settlement Vannovsky near Ashkhabad. Type in Leningrad.

Subtribe 2. HYOSCYAMINAE Dun. in DC. Prodr. XIII, 1 (1852) 7 ('Hyoscyameae'); Wettst. in Engl. u. Pr. Pflanzenfam. IV, 3b, 16; Baehni in Candollea, X, 481, ampl.—Corolla tubular, tubular-campanulate, or infundibuliform, sometimes slightly irregular. Fruit capsule; ovule campylotropous: arcuate, circular, or spiral.

### Genus 1317. *HYOSCYAMUS*<sup>1</sup> L.

L. Sp. pl. ed. 1 (1753) 179

Calyx campanulate, accrescent, hardening, mostly with prominent ribs. Corolla infundibuliform or tubular-infundibuliform with 5-lobed elongated limb, rather deeply incised anteriorly. Fruit circumscissile capsule with bulging operculum. Herbs with pinnatifid or pinnatipartite, rarely entire, leaves. Flowers in bracteate helicoid cymes, highly elongated and apparently racemose or spicate by fruiting stage.

About 20 species distributed from the Canary Islands to India (mainly in countries of the Near East); two ruderal-weed species distributed all over Europe and southern Siberia up to Japan.

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<sup>1</sup> From the Greek *hys*—hog and *kyamos*—a bean or pod. Name of henbane given by Dioscorides.

- 87 1. Fruiting calyx tubular-infundibuliform, tapering into narrow conical base; corolla 10–14 mm long, equaling or slightly exceeding calyx ..... 8. *H. pusillus* L.  
 + Fruiting calyx campanulate or urceolate, with broad base; corolla (2) 2.5–5 cm long, twice as long as calyx ..... 2.  
 2. Calyx with broad triangular teeth, with or without short sharp tip, in fruit  $1/6$ – $1/4$ ( $2/7$ ) as long as tube ..... 3.  
 + Calyx with narrow, lanceolate teeth, with cuspidate sharp tip in fruit ( $1/3$ ) $2/5$ – $1/2$  as long as tube ..... 5.  
 3. All leaves petiolate, shallowly lobed or coarsely dentate with broad, mostly obtuse lobes or rounded teeth; fruiting calyx campanulate, without or with slight constriction below limb, teeth mostly without sharp tip; corolla yellow, without colored reticulate veins, but sometimes with violet throat ..... 7. *H. albus* L.  
 + Only lower leaves petiolate, upper sessile, amplexicaul; calyx urceolate, distinctly constricted, teeth with sharp tip; corolla usually yellowish, with purple-violet reticulate veins and dark violet throat (form without colored reticulate veins has been observed) ..... 4.  
 4. Biennial (winter) plant with stout, soft, branched root and usually deeply pinnatifid or partite leaves; flowering in early summer ..... 5. *H. niger* L.  
 + Annual, with slender, simple, woody root; leaves shallowly lobed or a few entire; flowering at end of summer ..... 6. *H. bohemicus* F.W. Schmidt  
 5. Corolla pale (white or slightly yellowish) with dark violet reticulate veins and throat ..... 6.  
 + Corolla dull purple with dark violet vein reticulum, throat similar to limb in color or paler ..... 7.  
 6. All leaves (except sometimes apical floral leaves) petiolate, cauline large, up to 20(28) cm long (excluding petiole), ovate, with broad base, shallowly lobed or coarsely dentate; seeds finely deeply pitted, pits separated by fine membranous septa; plant up to 1–1.5 m tall, with thick rootstock ..... 4. *H. turcomanicus* Pojark.  
 + Leaves up to 8–9 cm long, upper cauline and floral leaves sessile; cauline leaves linear-lanceolate to ovate-lanceolate, deeply lobed or partite; seeds shallowly pitted, pits separated by thick septa; smaller plant with slender rootstock ..... 3. *H. kopetdaghi* Pojark.  
 7. Radical and cauline leaves entire or partly pinnatifid, with 2–4 lobes on each side ..... 2. *H. camerarii* Fisch. and Mey.  
 88 + Radical and cauline leaves deeply pinnatifid with 5–6 segments on each side ..... 1. *H. reticulatus* L.

Section 1. *Euhysocyamus* Wettst. in Pflanzenfam. IV, 3 (1895)

18.—Fruiting calyx erect, on short stalk. Stamens included within corolla.

Subsection 1. *Melanodyctii* Pojark. in Bot. zhurn. SSSR, XXVII, 6 (1942) 124.—Corolla with dark-colored vein reticulate, infundibuliform, with short tube and broad limb, lobes nearly equal.

Series 1. *Reticulati* Pojark. in Bot. zhurn. SSSR, XXVII, 6 (1942) 124.—Fruiting calyx tubular-campanulate, not constricted near middle, teeth  $1/3-1/2$  as long as tube. corolla uniformly colored purple, violet or brown, with dark reticulate veins. Capsule with bulging operculum (more than hemispherical). Seeds shallowly pitted, separated by thick septa with papillose surface. Perennials, sometimes found in biennial (and annual ?) form with lower leaves petiolate, upper sessile but not amplexicaul.

Besides two Caucasian species, this series apparently includes *H. squarrosus* Griff. from Baluchistan.

1. *H. reticulatus* L. Sp. pl. ed. 2 (1762) 257; Dun. in DC. Prodr. XIII, 1, 547; Boiss. Fl. or. IV, 295, p.p.; Grossh. Fl. Kavk. III, 353, p.p.; Pojarkova in Bot. zhurn. SSSR, XXVII, 6, 124.—*H. pinnatifidus* Schlecht. in Linnaea, XVII (1843) 127.—*H. camerarii*  $\beta$ . *villosum* C. Koch in Linnaea, XXII (1845) 736—*l.c.*: Jaub. and Spach. Illustr. pl. or. V, tab. 416; Pojarkova, l.c. plate 1, fig. a.

Perennial, biennial. Mostly perennial, with vertical root and short multicapitate rootstock, covered with brown scales and remnants of leaf petioles, rarely biennial (or sometimes annual ?). Stem simple, rarely branched, with glandular arachnoid pubescence, densely so in upper part, on nodes below inflorescence and also on petioles. Leaves almost similar in color on both surfaces, with flocculent-arachnoid pubescence, later glabrescent, lanceolate or linear-lanceolate, upper sometimes oblong-ovate, all leaves long-acuminate; radical and cauline leaves deeply pinnatipartite; with 5–6 lanceolate acuminate lobes on each side; middle leaves sometimes bipinnatipartite with often unequal lobes: large lobes pinnatifid, partite, or partly dentate, small entire lobes in sinuses of larger ones; radical leaves in rosette, with long petiole ( $2/3$  as long as lamina); cauline leaves with petioles gradually reducing toward stem tip, uppermost and floral leaves sessile; floral leaves usually less incised, pinnatipartite (lower ones) or pinnatifid with 2–3 pairs of lobes, upper sometimes entire, lanceolate-linear. Flowers on short, 3–6 mm long pedicels. Calyx in flowers broadly campanulate-obconical, glandular-lanate with patent hairs toward base and short appressed above, parted to middle into somewhat unequal lanceolate or deltoid lobes with long-aristate teeth, in fruit campanulate-tubular, 20–28 mm long, rigid with 10 prominent thick longitudinal veins, reticulate in upper part, teeth mostly somewhat recurved, ( $1/3$ ) $2/5-1/2$  as long as tube. Corolla dull



violet (or brownish)—purple, with darker violet reticulate veins, and similarly colored or little brighter throat, 2.5–3.5 cm long, with short tube up to  $(1/6)1/5$  as long as limb; limb broad with short obtuse lobes, puberulent outside. Filaments pilose up to middle inserted in upper part of tube at this level with hairy ring. Style glabrous, exerted from corolla. Capsule  $2/3$  as long as calyx, operculum noticeably bulging, about  $2/3$  as long as capsule. Seeds brownish gray, with rather large pits separated by thick sinuous septa, coarsely papillose on surface. Flowering from second half of April to June. Fruiting from first half of June.

On open dry stony and rubbly mountain slopes in lower and middle belts, also on roadsides and as weed among crops as well as in low-lying regions.—*Caucasus*: eastern Transcaucasia (southeastern region), southern Transcaucasia. *General distribution*: Balkan States-Asia Minor (eastern region—Asia Minor, northern part of Syria). Described from Syria. Type in London.

*Note*. Polymorphic and perhaps an aggregate species in need of further study. In materials from the Caucasus, *H. reticulatus* is represented mainly as the perennial form characterized by a well developed rootstock, short (15–30 cm tall at flowering stage) simple stem or a few sparsely branched stems, growing on stony and rubbly slopes of lower and middle mountain zones, these being the primary habitat of this species. The biennial form is represented by larger, 30–100 cm tall plants, generally profusely branched, usually with single stem and, according to the tabulated information, a ruderal weed. In the southern part of the area, *H. reticulatus* is apparently found mainly as a biennial or an annual. The existence of perennial and biennial (winter) or annual forms is observed in several species  
90 (*H. turcomanicus*, *H. albus*). In some cases, these forms are morphologically distinct and are perhaps differentiated geographically (*H. niger* and *H. bohemicus*). A solution to the problem of the taxonomic significance of the perennial form on the one hand and of the biennial and annual forms of *H. reticulatus* on the other hand, as well as the general question of the racial composition of this species, requires further material and, importantly, observation under natural conditions.

2. *H. camerarii* Fisch. and Mey. in Ind. sem. hort. Petrop. IV (1837) 38; Hohenack. Enum. pl. Talysch. (1838) 84; Pojarkova in Bot. zhurn. SSSR, XXVII, 6, 125; Grossh. Opred. rast. Kavk. 296.—*H. reticulatus* auct.: C.A.M. Verz. Pflanz. Cauc. Casp. Meer (1831) 383; Grossh. Fl. Kavk. III, 357, p.p.; non L.—*H. reticulatus* var. *integrifolius* Boiss. Fl. or. IV (1879) 295.—*lc.*: Pojarkova, l.c. plate 1, fig. b–b<sup>2</sup>.

Perennial. Similar to previous species, distinguished mainly by less dissected leaves: radical and often lower cauline leaves entire or with a

few teeth and cauline leaves shallowly lobed (usually not deeper than middle of blade) into 3–4(5) lobes; floral leaves mostly entire, rarely with 1–2 pairs of teeth near base. Flowering from second half of June or July. Fruiting from second half of July.

Observed on dry rubbly mountain slopes in the middle belt (up to altitude of 1900 m), sometimes as ruderal weed.—*Caucasus*: Talysh. *General distribution*: Mediterranean Region (eastern Syria, Palestine, Mesopotamia). Iran (northwestern region). Described from Talysh. Type in Leningrad.

Series 2. *Afghanici* Pojark. in Bot. zhurn. SSSR, XXVII, 6 (1942) 128.—Fruiting calyx tubular-campanulate, not constricted near middle. Corolla pale, with violet reticulate veins and dark violet throat. Capsule with bulging operculum. Seeds pitted, with thick septa, more or less flat on surface (not cristate or coarsely papillose). Upper leaves shortly petiolate sessile, but not amplexicaul.

Besides *H. kopetdaghi* Pojark., this series also includes *H. afghanicus* Pojark. from eastern Afghanistan and *H. kotschyanus* Pojark. from southwest Iran.

3. *H. kopetdaghi* Pojark. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XI (1949) 144.

Perennial (sometimes apparently biennial). Plant 30–45 cm tall, with short, up to 12 mm thick, rootstock, covered with remnants of brown scale leaves. Stems 1–2, slender, erect, simple or with a few terminal branches; pubescence white, glandular-arachnoid. Leaves thin, bright green; upper surface pilose only along ribs, lower surface with sparse, arachnoid, pubescence, densely tomentose along ribs; radical leaves long-  
 91 petiolate (half as long as lamina), linear-lanceolate, acuminate, 8–9 cm long, sinuate-pinnatifid; lower cauline narrowly lanceolate to lanceolate-ovate, pinnatifid or partite, with 3–5 triangular or lanceolate, acute or acuminate lobes on each side, petioles shorter; upper cauline leaves subsessile, oblong-ovate, rarely lanceolate, acuminate, with cuneate base, shallowly sinuate-pinnatifid or incised, with 2–3(5) unequal and partly irregular lobes on each side or partly entire; floral leaves sessile, ovate, with truncate or rounded base, lower sometimes incised near base, upper entire. Flowers on short pedicels. Calyx at first pilose beneath, herbaceous, obconical, divided to middle into 5 unequal, lanceolate lobes with aristate sharp teeth; after flowering calyx accrescent and glabrate, hard, campanulate, with coarse veins, teeth  $2/5$ – $1/2$  as long as tube. Corolla 2–2.5 cm long, twice as long as calyx, slightly glandular-pubescent outside, with short tube (about  $1/3$  as long as limb), and a few unequal, obtuse or subacute lobes, with dense reticulum of violet veins and dark violet throat. Stamens almost half as long as corolla (two shorter than others), with

filaments inserted in upper part of tube, sparsely pilose at base. Style slightly exserted. Capsule  $2/3$  as long as calyx, with moderately bulging (not spherical) operculum. Seeds with sinuous thick septa, flat on surface. Flowering from May. Fruiting from June.

In dry ravines, sometimes among crops.—*Soviet Central Asia*: mountainous Turkmenia (Kopet-Dag). *General distribution*: Iran (Elburz mountains, northern Azerbaidzhan). Described from Kopet-Dag, from ravines between Gaudan and Kurtusu villages. Type in Ashkhabad.

*Note*. A plant very similar to *H. kopetdaghi*, collected with ripe fruits in southern Transcaucasia between Dzhulfa and Ordubad, is, however, distinguished from the Turkmenian and Iranian plants by a pubescent, less coarsely veined calyx with shorter teeth. O. Fedtschenko's specimen from the vicinity of Samarkand (given in Perech. rast. Turkest. 5, 73—*H. reticulatus*) should apparently be referred to *H. kopetdaghi*, though collected in a condition in which precise identification was not possible. In case the discovery of *H. kopetdaghi* in Transcaucasia and Uzbekistan is confirmed, the distribution of this species will prove to be much wider than so far represented on the basis of completely reliable specimens.

Series 3. *Turcomanici* Pojark. in Bot. zhurn. SSSR, XXVII, 6 (1942) 127.—Fruiting calyx tubular-campanulate, without constriction, teeth  $2/5$ – $1/2$  as long as tube. Corolla infundibuliform, whitish, with violet  
92 reticulate veins and dark violet throat. Operculum of capsule slightly bulging; seeds reticulate-pitted, with small, deep pits separated by thin septa. Perennial plant with thick multicapitate rootstock; all cauline leaves petiolate.

4. *H. turcomanicus* Pojark. in Bot. zhurn. SSSR, XXVII, 6 (1942) 127.—*H. reticulatus* auct. fl. turc.; B. Fedtsch. in O. and B. Fedtsch. Perech. rast. Turkest. 5 (1913) 73 (excl. synonym.), non L.—*lc.*: Pojarkova l.c. plate 3.—*Exs.*: Sinten. Iter. transc.-pers. a. 1900–1901, no. 135.

Perennial. Up to 1–1.5 m tall; root thick, vertical transforming into short, multicapitate rootstock covered with remnants of dark brown scaly leaves. Stems simple or branched above, thick, strong, erect, densely pubescent with viscid sinuous hairs, often long, especially in upper part and sometimes forming tomentum in lower part. Leaves dark green, young leaves covered on both surfaces with sessile or short-stalked glands and viscid hairs; mature leaves often pilose underneath only along veins; cauline leaves (excluding petiole) 8–20(28) cm long and 4–11(19) cm broad, gradually reduced upward and transforming into floral leaves, oblong-ovate, long-acuminate, rarely triangular ovate, short-acuminate with truncate or broadly cuneate base, slightly decurrent on petiole, coarsely sinuate-dentate or incised, or shallowly pinatifid, teeth or lobes triangular, acute or acuminate; petioles broad,



slightly flat, pubescent generally with long, viscid, patent hairs, lower ones almost equaling and upper ones  $1/3-1/2$  as long as lamina; floral leaves sinuate-lobed or dentate, sometimes entire, shortly petiolate, only uppermost sometimes sessile. Flowers initially crowded in terminal helicoid cymes on stem and branches, elongating after flowering (up to 70 cm). Pedicels 2–8 mm long, sometimes 2–2.5 mm long in lowermost flowers. Calyx densely patently pilose in lower part, herbaceous at anthesis, soft, obconical, with triangular-lanceolate teeth almost equaling tube, 2–2.5 cm long; in fruit 2.7–4 cm long, hardening, tubular-campanulate, with teeth  $2/5-1/2$  as long as tube, with 10 longitudinally ribbed veins and distinct network of lateral veins. Corolla 3.2–4.5 cm long, glandular-pubescent outside, infundibuliform, with slightly oblique, broad limb, 3.5–4 times as long as tube, lobes obtuse, subequal. Anthers twice as long as tube, filaments hairy at base, inserted in lower part of tube. Ovary glabrous; style slightly longer than corolla. Capsule 11–12 mm long,  $1/3-1/2$  as long as enclosing calyx, dehiscing at top by flat or slightly bulging operculum. Seeds brownish gray, deeply and finely pitted. Flowering from second half of April of May. Fruiting in June.

- 93 On dry stony and silty mountain slopes and ravines, occasionally among crops.—*Soviet Central Asia*: Tien Shan (in Mogl-Tau mountains), mountainous Turkmenia (Kopet-Dag Range). *General distribution*: Iran (northern section - Astrabad (now Gorgan)). Described from central Kopet-Dag, vicinity of Nevtonovsky village. Type in Leningrad.

Series 4. *Nigri* Pojark. in Bot. zhurn. SSSR, XXVII, 6 (1942) 129.—Fruiting calyx urceolate, constricted above middle, with broad, short ( $1/5-2/7$  as long as tube) teeth. Corolla yellowish with purple reticulate veins and dull purple-violet throat. Capsule with markedly bulging operculum. Seeds seeply reticulate-pitted, pits separated by fine, sinuous septa with dentate surface. Annual and biennial plants; leaves, except lower ones, sessile, semi-amplexicaul.

Two species, cited below.

5. *H. niger* L. Sp. pl. (1753) 179; M.B. Fl. taur.-cauc. I, 163; Ldb. Fl. Ross. III, 183, p.p. (excl. var.  $\beta$  and  $\gamma$ ); Turcz. Fl. baic-dah. II, 322; Dun. in DC. Prodr. XIII, 1, 546, excl. var.  $\beta$  and  $\gamma$ ; Boiss. Fl. or. IV, 294, excl. syn.; Schmalh. Fl. II, 252, p.p.; Grossh. Fl. Kavk. III, 353, p.p.; Kryl. Fl. Zap. Sib. X, 2403.—*H. vulgaris* Neck. Delic. Gallo-belg. I (1768) 122, nom. abort.—? *H. persicus* Boiss. and Buhse in Nouv. Mém. Soc. Nat. Mosc. XII (XVIII) (1860) 158.—*H. niger spontaneous* Corr. in Ber. deutsch. bot. Gesellsch. XXI (1903) 195.—*H. niger biennis* Corr. in Ber. deutsch. bot. Gesellsch. XXII (1904) 518.—*C. biennis* Kreyer in Sov. bot. (1941) 1–2. 44. cum. auct. Correns.— *Ic.*: Rchb. Ic. fl. Germ. XX, tab.



MDCXXIII Hegi, *Illustr. Fl. Mittel-Eur.* V, 4, tab. 232, f. 1; f. 3402, 3403; Javorka, *Iconogr. Fl. Hung.* f. 3214. Henbane.

Biennial. Winter plant covered with soft, viscid, patent bloom; fetid. Root vertical up to 2(3) cm thick, branched, soft, sometimes almost spongy, rugose, with thickened collar. Stem 20–115 cm tall, 1.5(2) cm thick at base, green, simple only in weak stunted plants, but usually branched. Leaves soft, nonglossy, dark green above, grayish underneath, lighter, densely hairy along veins and margin; basal leaves (rosette) long petiolate, oblong-ovate or elliptical, sinuate-pinnatifid; cauline sessile, semi-amplexicaul, oblong-lanceolate, sinuate-lobed or deeply incised, with triangular or triangular-lanceolate, acuminate or acute, generally 4–5, lobes or teeth. Flowers sessile crowded at end of stem and branches in leafy helicoid cymes, elongated after flowering; floral leaves sessile, oblong, or narrowly lanceolate, with a few teeth or entire. Flowering calyx herbaceous, 10–22 mm long, tubular below, broadened and campanulate  
94 above middle, with broad triangular sharp teeth; fruiting calyx accrescent, 21–32 mm long, hardening, urceolate, broadening and densely patently pilose in lower part, with constriction above middle and rather widespread, short, aristate sharp teeth,  $(1/6)1/5$ – $1/4(2/7)$  as long as tube. Corolla 2–4.5 cm long, infundibuliform, dull yellowish or rarely whitish, with purple reticulate veins, throat and upper part of tube purple-violet, lobes obtuse, somewhat unequal. Stamens unequal, 2 shorter, 3 longer, slightly exceeding throat; filaments inserted in middle of tube, pilose in lower part; ovary glabrous; style pilose in lower part. Capsule broad at base, closely enclosed within calyx, latter twice as long. Seeds numerous (up to 500) brownish gray, finely pitted. Flowering from first half of May (Soviet Central Asia) June to August. Fruiting from second half of June to August.

Ruderal plant, growing near habitations, roads, on garbage sites, in kitchen gardens, rarely as weed in fields and neglected pastures.—*European USSR*: Karelia-Lapland (southern region, rare), Dvina-Pechora (southern section), Ladoga-Ilmen, Baltic States, Upper Volga, Volga-Kama (western section), Upper Dnieper (rare), Middle Dnieper (rare, northern region), Volga-Don, Trans-Volga Region, Black Sea (eastern region), Crimea, Lower Volga; *Caucasus*: all regions; *Western Siberia*: Ob' Region (southern part) Upper Tobol, Irtysh, Altai; *Eastern Siberia*: Yenisei (south), Lena-Kola (southeastern section), Angara-Sayan, Dauria (western section); *Soviet Far East*: Ussuri (rare); *Soviet Central Asia*: Aral-Caspian Region (northern section), Balkhash Region, mountainous Turkmenia, Pamiro-Alai, Tien Shan, Dzh.-Tarbagatai. *General distribution*: Scandinavia, Central and Atlantic Europe, Mediterranean Region, Balkan States Asia Minor, Iran, Mongolia, China; wild in North America and Australia. Described from Europe. Type in London.

*Economic importance:* Poisonous and medicinal (narcotic) plant. All its parts contain toxic alkaloids: hyoscyamine (0.02)0.05–0.07% a smaller quantity of hyoscyne or scopolamine and atropine (as a derivative of hyoscyamine); the root is richer in alkaloids than the leaves and seeds; the latter contains the even more bitter glucose hyoscyapicrin, choline, a waxy material hyosterol, phytosterol, fatty oil (15–28%), and other substances. Henbane is included in the pharmacopeia of most countries. Its leaves are used, especially those of the rosette, being the richest in alkaloids. Rarely, leafy tops of stems and branches are also used. Henbane is used mostly as an external analgesic in rheumatic and gout pains and in cases of contusion; it is included in the composition of hyoscyamus oil, which is an extract of henbane (usually along with camphor and chloroform), prepared in sunflower oil. Pure oil obtained by squeezing henbane seeds does not possess narcotic properties. The intake of small doses of henbane has a soothing effect, but in large doses it causes poisoning accompanied by severe excitation. Henbane is cultivated in Europe as a medicinal plant. The medicinal properties of henbane were known in ancient times in Egypt, Greece and Rome; in the Middle Ages, it was used as an anesthetic in surgical operations. Oil from the seeds was used in ancient Egypt for burning. An aqueous extract from the leaves in a bismuth bath dyes wool in olive color. A highly concentrated form of the sap yields a silvery white paint.

95 6. *H. bohemicus* F.W. Schmidt. Fl. böhm. III (1794) 31.—*H. pal-lidus* W. and K. ex Willd. Enum. pl. hort. Berol. I (1809) 227; Bess. Enum. pl. Volh. 11.—*H. agrestis* Kit. ex Schultes, Oesterr. Fl. ed. 2, I (1814) 383; Kreyer in Sov. bot. 1–2 (1941), 44; Grossh. Opred. rast. Kavk. 296.—*H. verviensis* Lej. Fl. Spa, I (1811) 116.—*H. pictus* Roth, Nov. pl. sp. (1821) 119.—*H. niger*  $\beta$ . *annuus* Sims in Curtis Bot. Mag. I (1823) ad tab. 2394.—*H. niger*  $\beta$ . *agrestis* Koch, Syn. fl. Germ. (1837) 509; Ldb. Fl. Ross. III, 183; Dun. in DC. Prodr. XIII, 1. 546.—*H. niger* auct. fl. ross. p.p. non L.—*lc.*: Bot. Mag. tab. 2394; Sweet, Brit. Fl. I, tab. 27.

Annual. Plant 14–60(80) cm tall, with slender woody, unbranched root without a distinct root collar. Stem simple, patently finely glandular-hairy. Leaves bright green, upper surface glabrous or sparsely hairy along midrib, glandular-hairy underneath only along veins, margin often long ciliate; radical rosette absent; cauline leaves ovate, angular- or sinuate-dentate, rarely incised, with 1–3(5) often unequal teeth on each side; basal leaves somewhat long petiolate; middle ones shortly petiolate or sessile and, along with upper floral leaves, semi-amplexicaul; floral leaves often lanceolate, nearly always entire; rarely all leaves entire (var. *integrifolius* (Wallr.) Pojark.). In other respects, similar to *H. niger* L., but flowers smaller on an average; corolla not exceeding 2.5 cm, sometimes without anthocyanin, whitish, veins not colored and with yellowish throat (var.

*pallidus* (W. and K.) Pojark. = *H. pallidus* W. and Kit. ex Willd.— *Ic.*: Rchb.  *Ic.* fl. Germ. XX, tab. 1623). Flowering from (June) July to August. Fruiting from second half of August (in Siberia and northern regions of European USSR, seeds do not mature).

Weed among crops, rarely ruderal, near roads, in wastelands, near habitations.—*European USSR*: Baltic States, Ladoga-Ilmen (rare), Upper Dnieper, Middle Dnieper, Volga-Don, Volga Region. Upper Dniester, Bessarabia, Black Sea Region, Crimea, Lower Don; *Caucasus*: all regions, but mainly western and southern Transcaucasia; *Western Siberia*: Upper Tobol (rare, introduced); *Soviet Far East*: Ussuri; *Soviet Central Asia*: rare (introduced ?), mountainous Turkmenia. *General distribution*: Central and Atlantic Europe, Mediterranean Region, Balkan States Asia Minor. India-Himalayas, China. Described from Chekhia. Type not known.

- 96 *Economic importance*: Chemical properties the same as those of *H. niger*, but *H. bohemicus* is not as rich in alkaloids (Kreyer, l.c. p. 43). As a pharmaceutic raw material, this species is hardly used due to its poor green-mass yield.

*Note*. 1. Authors who treat annual henbane as a separate species, recognize it as *H. agrestis* Kit.; but the name *H. bohemicus* F.W. Schmidt should take priority, since the author's diagnosis and the explanatory note leave no doubt that they refer to annual henbane, although he wrongly attributed a biennial character to this species.

2. *H. bohemicus* is distinguished from *H. niger*, apart from the simple stem and the annual, woody (and not fleshy) simple root, by the very sparsely pubescent and less divided leaves and the presence of entire upper leaves and smaller flowers. The geographical distribution of both species (as already noted by Kreyer, l.c.) is not the same: *H. bohemicus*, for example, is not found over the entire extent of Siberia and Soviet Central Asia (it is very rarely found as an accidental introduced plant), but is quite common in southern regions of the European USSR, especially in those southern regions where *H. niger* is rare.

Subsection 2. *Adycti* Pojark. subsect. nov. hoc loco.—Corolla tubular-infundibuliform, tube almost as long as limb; limb not much broadened, monochromatic (reticulate veins not distinguished by coloration).

Series 5. *Albi* Pojark.—Fruiting calyx campanulate, without constriction or only slightly constricted below limb, not narrowed toward base, teeth 1/6–1/4 as long as tube, usually without aristate tip; or with very short mucro. Corolla tubular-infundibuliform, with monochromatic yellow limb and yellow or violet throat. Operculum of capsule bulging. Annuals or biennials, rarely perennials with petiolate leaves.

7. *H. albus* L. Sp. p. (1753) 180; M.B. Fl. taur.-cauc. I, 164; Ldb. Fl. Ross. III, 184; Dun. in DC. Prodr. XIII, 1, 548; Boiss. Fl. or. IV, 296



(excl. var.); Schmalh. Fl. II, 252.— *Ic.*: Lam. Encycl. meth. Planches, I, tab. 117, f. 2; Rchb. Ic. fl. Germ. XX, tab. 1623, f. 1; Fedtsch. and Fler. Fl. Evrop. Ross. fig. 768.

97 Annual or biennial. Glaucous-green annual or biennial (winter), occasionally perennial plant with vertical woody root. Stem 5–50 cm tall, herbaceous, erect or slightly ascending, simple or branched above, densely, patently glandular-hairy along veins, all petiolate, cauline broadly ovate sometimes suborbicular with cordate, truncate or broadly cuneate base, sharply tapering toward apex, subacute or obtuse, shallowly sinuate-lobed or coarsely dentate, with 3–5 spaced broad triangular obtuse or acute rather unequal and often asymmetrically distributed teeth or lobes on each side; floral leaves similar to cauline leaves or narrower, with regularly spaced teeth. Flowers subsessile or lower ones on 5–10 mm long pedicels. Calyx tubular-campanulate, somewhat broader in fruit, accrescent (1.5–2.5 cm long), with fairly broad limb, often with slight constriction below it, and short ( $1/6$ – $1/4$  as long as tube) broad triangular, acute, almost equal teeth, but without aristate tip; patently glandular-hairy outside, subsequently with sharp distinct reticulate veins. Corolla with pale yellow monochromatic limb and with yellow or violet throat, tube nearly equaling limb; noticeably slanting, with unequal lobes. Stamens unequal, longer, almost equaling corolla, filaments hairy below, inserted in lower part of tube. Style glabrous, equaling stamens. Capsule  $2/3$  as long as calyx, with bulging operculum. Seeds about 1.5 mm long and 1–1.25 mm broad, whitish gray, reniform, pitted, pits separated by thick septa. Flowering from May to September. Fruiting from June.

Escape, in fields, near roads. *European USSR*: Middle Dnieper, Bessarabia, Black Sea Region, Crimea. *General distribution*: Mediterranean Region (western and eastern sections), Balkan States-Asia Minor. Described from southern Europe. Type in London.

*Note*. The perennial form of this species was discovered in Bessarabia and is occasionally found over the entire area—along with the biennial form. Some authors considered it a separate species—*H. major* Mill. Gard. Dict. (1768) [*H. varians* Vis in Bot. Zeit. Ergänzb. (1829) 7; Fl. Dalm. I, tab. 24, f. 2.—*H. canariensis* Ker. in Bot. Reg. tab. 180]. *H. major* is described as always having a violet-colored throat and narrow entire floral leaves. The taxonomic significance of this form, however, is not clear since its genetic status is not verified, and it is assumed that the perennial character of *H. albus* is an accidental phenomenon.

*Economic importance*: In chemical properties it is very similar to *H. niger* L. In the aerial ('herbaceous') parts 0.35% atropine has been discovered; hyoscyamine is present, apparently, only during the flowering stage; the roots and seeds contain hyoscyamine along with atropine.



Series 6. *Pusilli* Pojark.—Calyx infundibuliform in fruit, narrowed toward base, with teeth tapering into aristate tip. Corolla tubular-infundibuliform, with a monochromatic yellow limb and violet throat. Capsule with rather flat operculum. Seed pits separated by thick, coarsely papillose septa. Small annual plants. Monotypic series.

8. *H. pusillus* L. Sp. pl. (1753) 180; Mant. alt. 339; Idb. Fl. Ross. III, 184; Dun. in DC. Prodr. XIII, 1, 550; Boiss. Fl. or. IV, 294; Schmalh. Fl. II, 253; Fedtsch. and Fler. Fl. Evrop. Ross. 841; O. and B. Fedtsch. Perech. rast. Turkest. 5, 73; Grossh. Fl. Kavk. III, 353.—*H. aureus* Pall. Reise, III, (1776) 548, non L.—*H. micranthus* G. Don. Gen. syst. IV (1837) 12.—*H. pungens* Griseb. Spicil. fl. Rum. (1843) 52.—*lc.*: Jaub. and Spach, Illustr. pl. or. V, tab. 414; Fl. Yugo-Vost. VI, fig. 623.—*Exs.*: HFAM, No. 291.

Annual. Root slender, woody, with a few slender branches. Stem erect or ascending at base (3)6–35 cm tall, viscid due to short glandular hairs, more or less densely lanate, sometimes subglabrous, simple, mostly floriferous from or branched at base. Leaves thin, soft, bright green glandular-pubescent on both surfaces, with longer hairs along veins and margin, or subglabrous, narrowed into glandular-pilose, more or less winged petiole; cauline (1.5)3–7.5 cm long, crowded into basal rosette, with petiole almost equaling lamina, lanceolate, rhombic-lanceolate, oblong-lanceolate, or lanceolate-linear, obtuse or acute, subentire, with a few regularly spaced teeth; or deeply sinuate-pinnatifid or pinnatifid with 2–4 pairs of lobes or segments, lobes triangular, lanceolate or linear, entire or irregularly incised, acute, acuminate, or subobtusely; lower floral leaves similar to cauline leaves, upper with successively shorter petioles, usually broader than cauline leaves, lanceolate or lanceolate-ovate, with a few teeth or entire, rarely deeply lobed or parted, upper leaves shorter than fruiting calyx. Flowers sessile or lower ones on thick 3–5 mm long pedicels. Calyx densely covered with very minute sessile glands and short glandular hairs, and long patent hairs in lower part, herbaceous in flower, campanulate-obconical, (8)10–13 mm long; in fruit coriaceous, often subglabrous, with reticulate veins, (1.6)2–2.5 cm long, infundibuliform, with tube tapering conically toward base, limb broad; teeth divergent, identical, triangular or lanceolate, with aristate sharp tip. Corolla equaling calyx or slightly longer, 10–14 mm long, glabrous outside or sparsely hairy along veins, yellow with dark violet throat, tubular-infundibuliform, divided anteriorly almost to middle, with short semiorbicular lobes.

99 Stamens shorter than limb, with violet hairy filaments, inserted in upper part of tube. Style glabrous, equaling stamens. Capsule 1/3–2/5 as long as calyx, with slightly bulging operculum, 4–4.5 mm in diameter. Seeds 1.3 mm long and broad, brownish gray; pitted-rugose, with fine flat pits,

separated by thick sinuous, coarsely papillose septa or rugose-papillose. Flowering from April to June. Fruiting from second half of May to August.

On plain and high-mountain (Pamir) deserts, on sandy ridges, in arid soils supporting saxaul shrub and salt marshes, on rubbly slopes of dry foothills and mountains.—*European USSR*: Lower Volga; *Caucasus*: eastern and southern Transcaucasia; *Western Siberia*: Irtysh (extreme south); *Soviet Central Asia*: Aral-Caspian Region, Balkhash Region, Kyzyl Kum, Kara Kum, mountainous Turkmenia (foothills), Amu Darya, Syr Darya, Tien Shan (western section—rare, introduced), Pamiro-Alai. *General distribution*: Balkan States-Asia Minor, Armenia-Kurdistan, Iran, Arabia, India-Himalayas (Baluchistan). Kashgar-Dzh. (Kuldzha), Egypt. Described from Iran. Type in London.

### Genus 1318. *SCOPOLIA*<sup>1, 2</sup> Jacq.

Jacq. Observ. I (1764) 32 t. 20 ("*Scopola*"); Dun. in DC. Prodr. XIII (1852) 555, pro sect. generis *Scopolia* Jacq. excl. sect. *Physochlaena* and *Datora* Wettst. in Pflanzenfam. IV, 3b (1897) 16.—*Scopolina* Schult. Oesterr. Fl. II ed. (1814) 383.—*Anisodus* Link and Otto, Ic. plant. select. (1828)

77.—*Whitleya* Sweet, Brit. Fl. Gard. ser. I (1825) 125.

Flowers solitary, in stem bifurcations and leaf axils, mostly drooping, with reddish brown, violet, or greenish yellow corolla. Corolla tubular-campanulate, 5-lobed or dentate. Filaments shorter than style, inserted at base of corolla tube. Ovary bilocular. Calyx campanulate shortly 5-toothed, accrescent in fruit, loosely enclosing capsule, at least in upper part. Capsule subglobose, dehiscing by operculum. Herbs with erect, leafy stems, usually 2–3-forked, with entire leaves and perennial rootstock.

Includes 6 species, distributed in southern and central Europe, Mongolia, China, India, and Japan. One species is found in the USSR.

Section 1. *Euscopolia* Wettst. in Pflanzenfam. IV, 36 (1897) 16; *Scopolia* Dun. ex DC. Prodr. XIII (1852) 555, pro sect.—Corolla limb short, 5-toothed or obscurely so. Calyx 5-toothed or 5-lobed, slightly enlarged but not enclosing fruit and with almost smooth surface. Seeds reticulate-pitted.

- 100 1. *S. carniolica* Jacq. Observ. I (1764) 32, tab. 20; Ldb. Fl. Ross. III, 185; Grossh. Fl. Kavk. 3, 351; Sevostyanov, Dik. Posl. Podillya, 23.—*S. trichotoma* Moench, Meth. pl. (1794) 462.—*Hyoscyamus scopolia* L. Mant. Pl. (1767) 461.—*Scopolina atropoides* Schult. Oesterr. Fl. ed.

<sup>1</sup> Treatment by M.N. Semenova.

<sup>2</sup> Named after Scopolio, a doctor and naturalist.

2 (1814) 383.—*S. hladnikiana* Freyn ex Koch, Synops. ed. 2 (1814–1845) 585.—*S. viridiflora* Freyer ex Koch, l.c.—*S. carniolica* Schur, Enum. pl. Transs. (1866) 477.—*Scopolia caucasica* Kolesnik. in Tr. Nikitsk. bot. sada, 23 (1944) 3.—*S. tubiflora* Kreyer in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XII (1950) 264.—*lc.*: Jacq. l.c. t. 20; Yadov. rast. lugov i pastb. 391; Kultura lek. rast. 269.

Perennial. Rootstock horizontal, with anthocyanin rings or striations on ruptures. Stems glabrous, light green, up to 80 cm tall, 2–3-forked, sometimes simple. Basal leaves sessile, scale like; cauline leaves petiolate, ovate-oblong, acuminate, entire, often with 1–2 unequal teeth at apex, 3–15 cm long, 3.5–5.5 cm broad, with semiwinged 1.2–2 cm long petiole. Pedicels filiform, 1.5–2.5 cm long. Calyx less than half as long as corolla, light green, 5-toothed, 0.9–1.1 cm long and 0.5–0.6 cm broad at base; teeth triangular acuminate, 1/3–1/2 as long as calyx. Corolla campanulate or tubular-campanulate, brownish red or cherry-violet outside (sometimes greenish yellow), yellowish brown or yellowish green inside, sometimes pale violet, 2.1–2.4 cm long, obscurely 5-toothed, or 5-toothed with scarcely visible limb, or limb totally absent. Filaments erect, short, pubescent at base. Style erect; fruiting calyx only little larger than capsule, slightly inflated at base, 1.2–2.4 cm long and 1.1–1.2 cm across. Capsule globose, 0.9–1 cm in diameter. Seeds yellowish brown, reniform, 3.4 mm long, pitted-reticulate. Flowering from April to May (Plate IV, Fig. 2.).

In mountain forests, shady glades, and slopes.—*European USSR*: Upper Dniester, Bessarabia, Middle Dnieper; *Caucasus*: Ciscaucasia, western Transcaucasia. *General distribution*: central and southern Europe. Described from northeast of Italy. Type in Vienna.

*Economic importance*: The rootstock of the plant contains up to 0.9% alkaloids. It is used as the basic indigenous raw material for obtaining atropine and scopolamine.

*Note*. The following varieties are differentiated by the color and form of their corolla: *S. carniolica* var. *brevifolia* Dun. l.c.—with yellow flowers; *S. carniolica* var. *longifolia* Dun. l.c.—with subcylindrical corolla; *S. carniolica* var. *violacea* Sem. h. l. (= *S. caucasica* Kolesn.) with violet corolla. Plants related to the last variety are found in the Caucasus as well as in southern regions of western Europe.

### Genus 1319. *PHYSOCHLAINA*<sup>1, 2</sup> G. Don

G. Don, Gen. Hist. IV (1838) 470.—*Physochlaena* Miers in Ann. a. Mag. Nat. Hist. ser. II, V (1850) 471.—*Belenia* Dcne. in Jacquem. Voy. Bot.

<sup>1</sup> Treatment by M.N. Semenova.

<sup>2</sup> From the Greek *physa*—bladder and *chlaina*—an outer cover.



(1844) 113 t. 120.

Calyx tubular-campanulate in flower, markedly accrescent and inflated in fruit, completely enclosing capsule, coriaceous or membranous with reticulate venation and 10 longitudinal veins. Corolla infundibuliform, violet, limb 5-lobed. Ovary bilocular. Filaments inserted in middle of corolla. Stigma capitate, broad. Capsule subglobose, dehiscent transversely by 4-valved operculum. Flowers on short pubescent pedicels in terminal, ebracteate, umbellate, or racemose expanded inflorescence. Seeds light yellow, pitted. Perennial plants with fragile, whitish yellow rootstock and short, herbaceous, annual, erect stems.

The genus includes 6 species, 3 of which are found in the USSR.

1. Calyx in flower slightly exceeding half of corolla; in fruit markedly uniformly accrescent, becoming subcylindrical; filaments equaling corolla in length, pubescent at base. Entire aerial portion covered by glandular pubescence, most distinct on peduncles and calyces ..... 1. *P. orientalis* (M.B.) G. Don.
- + Calyx in flower less than of corolla length, markedly and unevenly accrescent in fruit, becoming subglobose or broadly ovoid, teeth and throat not enlarging; pubescence lanate-tomentose, with articulate hairs, most distinct on peduncles and calyces in flower; filaments glabrous 2.
2. Inflorescence racemose-clustered, filaments included in corolla tube, throat broadly campanulate ..... 2. *P. physaloides* (L.) G. Don.
- + Inflorescence capitate, condensed; flowers small, subsessile; filaments longer than narrow infundibuliform corolla ..... 3. *P. semenowii* Rgl.

104 1. *P. orientalis* (M.B.) G. Don. Gen. Hist. IV (1838) 470; Grossh. Fl. Kavk. 3, 351.—*Hyoscyamus orientalis* M.B. Fl. taur.-cauc. I (1808) 164; Lbd. Fl. Ross. III. 184—*P. dubia* Pascher in Fedde, Repert. sp. nov. VII (1909) 167; Grossh. l.c.—*l.c.*: Baillon, Hist. Pl. IX, 311; Yadov. rast. lugov i pastb. 402.

Perennial. Rootstock ascending, unevenly thickened. up to 1 cm thick. Stems few, erect, up to 60 cm tall. Pubescence glandular, denser toward apex and very conspicuous on peduncles and calyces. Leaves dark green, entire, sometimes sinuate, crispate-acuminate, deltoid-ovate oblong, cordate-cuneate at base, up to 11 cm long and 5.5 cm broad, narrowed into petiole. Inflorescence terminal, almost umbellate. Flowers on short, up to 0.5 cm long, pedicels. Calyx up to 0.8 cm long, shallowly 5-toothed, with somewhat triangular acuminate teeth 1/3 as long as calyx, accrescent to double length or more in fruit, throat and teeth also accrescent becoming coriaceous, subcylindrical with 10 longitudinal veins; pubescence usually persistent. Corolla twice as long as calyx, violet, white at base, 5-lobed, tubular-campanulate. Stamens pubescent at base, as long as corolla, style



violet, longer than corolla, with capitate stigma. Capsule globose, up to 0.9–1 cm in diameter, with hardly noticeably operculum shedding at maturity, topped by style base. Seeds light yellow, orbicular-ellipsoid pitted. Flowering from April to May.

In mountains, on stony slopes, up to the subalpine zone, at altitudes of up to 2200 m.—*Caucasus*: Ciscaucasia, western and eastern Transcaucasia, Dagestan; *Soviet Central Asia*: Syr Darya. *General distribution*: Balkan States-Asia Minor, Armenia Minor. Described from Kislovodsk Region. Type in Leningrad.

2. *P. physaloides* (L.) G. Don. Gen. Hist. IV (1838) 470; Kryl. Fl. Zap. Sib. X, 2404.—*Hyoscyamus physaloides* L. Amoen. Acad. VII (1769) 474; Turcz. Fl. baic.-dah. II, 323. Ldb. Fl. Ross. III, 184.—*Physochlaena physaloides* Miers Ann. a. Mag. Nat. Hist. ser. II, V (1850) 471.—*P. pseudophysaloides* Pascher in Fedde, Repert. VII (1909) 167.—*P. dahurica* Miers, l.c.—*Scopolia physaloides* Dun. in DC. Prodr. XIII (1852) 554.—*Atropa physaloides* Georgi, Besch. Russ. Reich. Nachtr. 12 (1802) 261.—*lc.*: Yadov. rast. lugov i pastb. (1950) 401.

Perennial. Rootstock almost creeping, ascending, up to 0.8 cm thick. Stems few, erect, branched above due to development of shoots from leaf axils, smooth below, lanate above with articulate hairs, more densely so closer to peduncles and calyces; base covered with scale leaves, shedding at flowering. Leaves entire or broadly sinuate, petiolate, with ovate or cordate, short-acuminate lamina, 1.5–7 cm long and 1–6 cm broad, sharply narrowed at base into 3-angled, almost equally long petiole. Inflorescence terminal, consisting of leafless racemose clusters on short tomentose peduncles. Calyx lanate, tubular-campanulate in flowers, 6–8 mm long and 2.5–3 cm broad, becoming inflated in fruit with reticulate venation, broadly ovate or subglobose, membranous, with 10 longitudinal veins; throat and lobes not enlarging in fruit. Corolla 2–3 times as long as calyx, violet, infundibuliform, with rather broad, almost campanulate, 5-lobed limb, corolla tube pubescent inside. Filaments glabrous, slightly shorter than corolla. Capsule globose, up to 1 cm in diameter, with small flat operculum. Seeds light yellow, pitted, orbicular reniform, with swollen radicle, about 2.5 mm long. Flowering from April to May (Plate IV, Fig. 1).

On open stony slopes of hills and mud cones in the steppes, in mountains, and on rocks.—*Western Siberia*: Irtysh, Altai; *Eastern Siberia*: Angara-Sayan, Dauriya, *Soviet Central Asia*: Aral-Caspian Region, Balkhash Region; *Soviet Far East*: Zeya-Bureya. *General distribution*: Mongolia, Japan, China. Described from cultivated specimens. Type in London.

*Economic importance*: Contains alkaloids with atropinic action. Poisonous.



Plate IV

1. *Physochlaina physaloides* (L.) G. Don, portion of plant, flower, corolla in section, calyx in fruit;—2. *Scopolia carniolica* Jacq., portion of plant, root, corolla in section, calyx in fruit, seed.

3. *P. semenowii* Rgl. in Bull. Soc. Nat. Mosc. XLI, I (1868) 95; Fedtsch. Rast. Turkest. 685.

Perennial. Rootstock large, multicapitate. Stems rather thick, erect, up to 35 cm or more tall, sparsely pubescent with articulate hairs of yellowish rusty color, densely so toward tip and most conspicuous on peduncles and calyces. Leaves alternate, triangular-ovate, with cuneate or subcordate base, scattered over stem, entire, margin sinuate, crispate, acuminate or subobtusate, up to 5 cm long including petiole; lamina more or less pubescent. Inflorescence 3–7 cm long, terminal, densely pubescent, drooping or almost so, globose-capitate, densely convoluted. Flowers subsessile, up to 1 cm long. Calyx up to 0.5 cm, tubular-campanulate, broader than corolla, shallowly 5-lobed, with triangular subobtusate lobes, markedly accrescent in fruit. Corolla narrowly tubular, slightly broad at base and more so in throat. Filaments longer than corolla. Capsule and seeds very similar to those of previous species. Flowering from May to June.

In mountains, mountain river valleys.—*Soviet Central Asia*: Tien Shan, Dzh.-Tarbagatai, Endemic. Described from Trans-Ilian Ala Tau. Type in Leningrad.

Tribe 3. NICOTIANEA G. Don, Gen. Syst. IV (1837) 399, p.p.; Miers, Illustr. South Amer. pl. I, Appendix, 164; Baehni in Candollea, X, 482.—Corolla regular, convoluted in bud, with plicate limb. Stamens 5.  
106 Fruit capsule or dry berry; embryo straight, slightly curved or subcircular.

Subtribe 1. NICOTIANINAE Dun. in DC. Prodr. XIII, 1 (1852) 7 ('Nicotianae') p.p.; Wettst. in Pflanzenfam. IV, 3b, 30; Baehni in Candollea, X, 483.—Calyx campanulate or tubular-campanulate. Fruit bilocular, capsule or dry berry.

### Genus 1320. *NICOTIANA*<sup>1</sup> L.

L. Sp. Pl. (1753) 180

Calyx tubular-campanulate or cupuliform. Corolla mostly infundibuliform or tubular, with broad 5-lobed, slightly zygomorphic limb. Stamens 5, 4 almost equal and one shorter; anthers dehiscing by longitudinal slit. Ovary 2- or rarely 4-chambered; style slender, generally with capitate stigma. Fruit ovoid, apiculate capsule, opening by 2–4 valves, bidentate or bifid at tip. Seeds numerous, very small, granular-reticulate. Mostly annual herbs, rarely perennials or shrubs and small trees, with viscid pubescence; strong smelling; leaves entire or slightly crispate-sinuate; flowers in terminal cymose racemes or panicles.

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<sup>1</sup> Named after Jean Nicot who introduced tobacco in France from Portugal.



The genus includes nearly 50 species, distributed mainly in America (in southern states of North America, and especially in the tropics), a few of them are found on islands of the Pacific Ocean and in Australia.

Many species of this genus are cultivated in temperate and tropical countries; some species providing smoking tobacco are of great economic importance. Others are grown as ornamentals.

1. Corolla greenish yellow, campanulate-tubular, with short tube, broadened just above calyx ..... \**N. rustica* L.
- + Corolla pink or red (rarely white), infundibuliform, with long tube, broadened much above calyx ..... \**N. tabacum* L.

\**N. tabacum* L. Sp. pl. (1753) 180; Dun. in DC. Prodr. XIII, 1, 557; Schmalh. Fl. II, 254; Grossg. Fl. Kavk. III, 357; Vznachn. rosl. UKrSSR, 371.— *Ic.*: Hegi Illustr. Fl. Mittel-Eur. V, 4, tab. 223, f. 3; f. 3431 and 3433; Bonn. Fl. compl. Fr. Suisse, VIII, tab. 434, f. 2028, Gleas. New Britt. and Brown. Fl. N. Amer. III, tab. 205. Tobacco.

Annual. Stem 0.75–1.5 m tall, herbaceous, simple or with few  
 107 branches, viscid, similar to leaves and calyx, due to glandular pubescence. Leaves alternate, entire; basal leaves narrowly elliptical, decurrent along stem; upper leaves narrowly lanceolate, long-acuminate, sessile or short-petiolate. Flowers in cymose panicles on short pedicels. Calyx 1–2 cm long, campanulate, with acute narrowly triangular teeth. Corolla 5–6 cm long, red or pink, rarely white, infundibuliform, with long and broad spreading limb, lobes broadly triangular, with sharply pointed tip. Capsule ellipsoidal-ovoid, apiculate. Seeds ovoid-reniform, very small. Flowering from July to September. Fruiting from September.

Cultivated in fields and kitchen gardens.—*European USSR*: Upper Dnieper, Middle Dnieper, Upper Dniester, Bessarabia, Black Sea Region, Crimea, Lower Volga; *Caucasus*: all regions; *Soviet Central Asia*: Kara Kum (occasionally), Syr Darya, Pamiro-Alai. *General distribution*: South America (native); cultivated in all countries of the tropical and subtropical zones and in southern sections of the Temperature Zone. Described from South America. Type in London.

*Economic importance*: Leaves of tobacco, dried and fermented, are used for smoking. They are used in the preparation of cigarette, cigar, and pipe tobacco. A substantial part of this product is exported. Leaves of tobacco (*folia Nicotianae*), and also their alkaloid nicotine are used in medicine in pure form and as nicotine salts. In addition to this, various preparations of tobacco smoke are useful in eliminating insects; tobacco smoke is used for the same purpose; the smoke can be used as a means of early forcing of plants.



The chief active principle of tobacco, namely, an alkaloid nicotine,  $C_{10}H_{14}N_2$ , is readily soluble in the pure form, odorless and colorless and turns brown on exposure to air. It is highly toxic: in corresponding doses, its effect is more drastic than that of cyanic acid. In small doses, nicotine acts initially on the nervous system as a stimulant, subsequently as a depressant. Prolonged usage of nicotine (through smoking) affects the vascular system, later adversely affecting the peripheral and central nervous system. Tobacco leaves contain 0.6–0.9% (up to 3%) nicotine; its quality varies, depending on the variety and the environment in which it is grown. Varieties of tobacco that do not contain nicotine have been discovered. The presence of nicotine in tobacco leaves is usually accompanied by small quantities of other similar alkaloids: nicotine, nicotelline, nicotinin, betanin, *i*-amigdaline, pyrrolidine, and *n*-methyl pyrrolidine. Tobacco leaves are rich in various enzymes. Some of them are found only in unfermented leaves; more than 10 enzymes have been noted. The seeds contain up to 0.5% nicotine. Other studies did not reveal the presence of nicotine, but solanine was observed. The fatty oil in the seeds—30–32% (up to 41.8%)—contains palmitic, butyric, and linoleic acids and a small quantity of stearic acid.

\**N. rustica* L. Sp. pl. (1753) 180; Dun. in DC. Prodr. XIII, 563; Schmalh. Fl. II, 254; Grossh. Fl. Kavk III, 357; Vizn. rosl. UkrSSR, 371.—*IC.*: Hegi, Illustr. Fl. Mittel-Eur. V, 4, tab. 283, f. 4, 5; f. 3432, 3433; Bonn. Fl. compl. Fr. Suiss. VIII, tab. 433, f. 2027; Gleás. New Britt. and Brown. Fl. N. Amer. III, tab. 205.

Annual. Stem over 1 m tall, herbaceous, glandular-pilose branching almost from base. Leaves all petiolate, soft, slightly fleshy, ovate, usually obtuse, rarely acute, with cordate base. Flowers in racemose panicle on short pedicels. Calyx broadly campanulate, 6–10 mm long, with broad triangular lobes. Corolla 1.5–2 cm long, with broad whitish tube and greenish yellow, flat, narrow limb with broad, ovate-triangular obtuse lobes. Capsule subglobose, with numerous extremely small, brown, ovoid seeds. Flowering from July to September.

Cultivated in fields and kitchen gardens.—*European USSR*: Upper Volga (southern region), Volga-Kama, Middle Dnieper, Volga-Don, Trans-Volga, Upper Dniester, Bessarabia, Black Sea Region, Crimea, Lower Don; *Caucasus*: all regions; *Soviet Central Asia*: Kara Kum (occasional), Balkhash Region, Syr Darya, Pamiro-Alai. *General distribution*: South America (Peru—native place); cultivated in all countries with tropical and subtropical climate and the more southern regions of the Temperate Zone (mainly in the USSR). Described from Mexico. Type in London.

*Economic importance:* The leaves and stems of *N. rustica* are used for smoking; they are used in the manufacture of shredded tobacco, cigarettes and also chewing tobacco and snuff. For obtaining nicotine and manufacturing insecticides, *N. rustica* is used on a larger scale than is *N. tabacum*. The two have similar chemical composition.

Tribe 4. *DATUREAE* Wettst. in Pflanzenfam. IV, 3b (1895) 27.—Stamens five, equal in length, with the anthers opening by longitudinal slit. Ovary bilocular, each locule divided by a false septum (sometimes not up to the tip), diverging from the rear side of the true septum; all locules of the same size. Fruit a capsule (in the USSR) or a berry. Herbs (in the tropics, also semishrubs, shrubs and trees), with entire or sinuate-dentate or lobed leaves and with solitary large flowers.

Subtribe 1. *DATURINAE* G. Don. Gen. syst. IV (1837) 399, p.p.; Baehni in Candollea, X, 483.—*Datureae* Wettst. in Pflanzenfam. IV, 3b (1895) 27, p.p.—Calyx long tubular. Fruit capsule, 4-lobed in lower part (due to false septa not reaching tip), or dry bilocular berry.

### Genus 1321. *DATURA*<sup>1</sup> L.

109 Calyx long tubular, 5-toothed, later circumscissile near base, base accrescent. Corolla large, tubular-infundibuliform, with plicate 5–10-toothed, angular-sinuate limb. Anthers not longer than corolla. Stigma bilobed. Fruit capsule, bilocular above, dehiscent by 4 valves or irregularly. Seeds numerous. Annual herbs (trees and shrubs are found in cultivated species).

The genus includes about 20 species.

In addition to the species of *Datura* given below, mention should be made of *Brugmansia candida* Pers. (*D. arborea* L.) which is cultivated sometimes in the south as an ornamental. It is a tree with drooping, large, fragrant, white flowers, limb without teeth and fruits in the form of an oblong, sweet berry (native of Chile, Peru).

1. Stem, petioles, and leaf veins densely pubescent; capsule very densely spiny; corolla 15–20 mm long, white, 10-toothed . \**D. innoxia* Mill.
- + Stem, petioles and lamina glabrous or with scattered hairs ..... 2.
2. Corolla 6–10(12) cm long; capsule erect, dehiscent by 4 equal valves.
- + Corolla 14–18 cm long, white, 5-toothed; capsule drooping, dehiscent by irregular rupture ..... \**D. metel* L.
3. Corolla white; upper spines on capsule much longer, thicker, and more dense than lower ones ..... 1. *D. stramonium* L.

<sup>1</sup> Arabic name for *D. stramonium* L.

- + Corolla bluish or purple-violet inside; upper and lower spines on capsule similar ..... *D. tatula* L.

1. *D. stramonium* L. Sp. pl. (1753) 179; M.B. Fl. taur.-cauc. I, 163; Ldb. Fl. Ross. III, 182; Dun. in DC. Prodr. XIII, 1, 540, excl. var.  $\beta$ .; Schmalh. Fl. II, 252; Grossh. Fl. Kavk. III, 357; Opred. rast. Kavk. 298; Kryl. Fl. Zap. Sib. X, 2402.—*Stramonium spinosum* Lam. Fl. fr. II (1778) 256; Gilib. Fl. lith. I, 39.—*S. foetidum* Scop. Fl. carn. ed. II (1772) 157.—*S. vulgatum* Gaertn. De fruct. et sem. II (1791) 243, tab. 132.— *Ic.*: Rchb. Ic. fl. Germ. XX, tab. 1624, f. 1; Fedtsch. and Fler. 110 Fl. Evrop. Ross. fig. 772; Fl. Yugo-Vost. VI, fig. 625; Hegi. Illustr. Fl. Mittel-Eur. V, 4, tab. 233, f. 2; f. 3429; Javorka, Iconogr. fl. Hung. f. 3227.

Annual. Plant (12)20–100(120) cm tall, fetid. Root fusiform, with numerous slender branches, white. Stem simple or dichotomously branched above, green, glabrous; branches pubescent on inner side, usually diverging at acute angle. Leaves with petioles equaling lamina or about half as long; basal leaves up to 20 cm long and broad, ovate, acuminate, cuneate at base, margin with large unequal acute or acuminate teeth, simple, rarely incised, upper surface dark green, lighter beneath, both surfaces sparsely puberulent, slightly more densely underneath (or pubescent only underneath). Flowers solitary in bifurcations of stem and branches, on straight, erect, pubescent, 7–12 mm long pedicels. Calyx 4–6 cm long, pale green, 5-angled, tubular, slightly inflated, with 5 acuminate teeth. Corolla 6–10(12) cm long, white, infundibuliform, with long narrow tube and plicate broad limb, cleft into 5 (very rarely 6) short broadly triangular lobes, sharply tapering above into slender 5–8 mm long cusp. Ovary densely covered with soft bristles, style slender, long. Fruit ovoid or subglobose capsule, surrounded below by recurved persistent, calyx base, spiny, often sparsely so in lower part, spines distinctly longer and thicker at apex; dehiscing by 4 valves, though not reaching base. Seeds reniform 3(3.5) mm long, black, with very finely pitted reticulate surface and large shallow indentations, mainly near bulging external margin. Flowering from April to September. Fruiting from July to October.

Ruderal plant, growing near habitations, in kitchen gardens, on garbage and dunghills, along pasture edges; in mountains (Caucasus, Soviet Central Asia). It grows up to the Temperate Zone, inclusive.—*European USSR*: Baltic Region, Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnieper, Upper Dniester, Bessarabia, Black Sea Region, Crimea, Lower Don, Lower Volga; *Caucasus*: all regions; *Western Siberia*: introduced, very rare, Irtysh (southern region); *Soviet Far East*: Ussuri (southern Region—introduced, rare). *Soviet Central Asia*: rare,



but found in all regions. *General distribution*: Europe, all regions south of southern Scandinavia, Dzh.-Kashgar. India-Himalayas. Also found in many other tropical and temperate countries.

*Note*. The question of the origin of *D. stramonium* has not yet been satisfactorily resolved, although several suggestions have been offered on this subject. Most authors are inclined to look for the native habitat of *D. stramonium* in the Eastern Hemisphere; the countries indicated in this respect are Asia Minor, Egypt, India, Caucasia, and countries surrounding the Caspian Sea. Several authors believe that *D. stramonium* migrated in Central and South America. *D. stramonium* has been known in Europe since the 16th century. Closely related species are also found in the Old as well as the New World. In Eurasia, the following species (with white flowers) are found to be closely related: *D. bertolonii* Parl. ex Guss.—Sicily, *D. inermis* Jacq.—Abyssinia, *D. wallichii* Dun.—Nepal; the first two are distinguished from *D. stramonium* by glabrous capsules, the last by leaves canescent on the upper surface. Of the American species, the Mexican ones are closely related: *D. quercifolia* H.B.K. and to a lesser extent *D. discolor* Bernh. Both species have an anthocyanin-colored corolla as in *D. tatula* L., the species closest to *D. stramonium*, regarded by several authors as a separate species assumed to be a native of Central or South America.

*Economic importance*: A highly poisonous and medicinal plant. All parts of *Datura* contain alkaloids: hyoscyamine  $C_{17}H_{23}NO_3$  in very large quantities (about 0.28% in leaves on an average and 0.33–0.48% in seeds) and a small quantity of scopolamine and atropine (an isomer of hyoscyamine). The seeds are also found to contain fatty oil (datura oil) 16–25%, linol 15%, palmitic acid 10%, butyric acid 6.2%, glycerol 9.6%, a small quantity of alcohols, aldehydes, ketones, etc. The peak quantity of alkaloids accumulates at the end of the summer and remains constant until the end of the vegetative period. The leaves of *Datura* and, frequently, also the seeds are used in the pharmacopeia of many countries. Extracts, tinctures, and candles are made from the seeds, while the leaves are included in the composition of antiasthmatic powders and cigarettes. *Datura* preparations are used for treating neuralgia resulting from rheumatism and asthma as an antispasmodic and narcotic remedy.

Sometimes cultivated as an ornamental plant.

2. *D. tatula* L. Sp. pl. ed. 2 (1762) 256; Bernh. in Linnaea, 8, 125; Schmalh. Fl. II, 252.—*Stramonium tatula* Moench, Meth. pl. (1794) 456.—*Datura stramonium* var. *tatula* Torr. Fl. North Mid. U.S. (1824) 232; Dun. in DC. Prodr. XIII, 1, 540.—*D. stramonium*  $\beta$ . *chalybea* W. Koch, Syn. fl. Germ. (1837) 509.—*lc.*: Rchb. Ic. fl. Germ. XX, tab. 1624, f. II; Javorka, Iconogr. fl. Hung, f. 3228.—*Exs.*: Hohenack. Arzn. u.



Handelpfl. No. 628. Fl. exs. Billot, Nos. 3662, 3662 bis; Sinten. Iter pers. a. 1900–1901 No. 1244 (sub *D. fastuosa*).

Annual. Very similar to preceding species; generally larger, profusely branched plant; branches divaricate at obtuse or nearly at right angle. Stem violet. Petioles, leaf veins, and part of calyx purple; lamina, always incised with large acuminate teeth, also incised in turn; often almost lobed; leaf base usually broadly cuneate to truncate, or sometimes slightly cordate. Corolla bluish to mauve-purple. Capsule ovoid, elongated, always densely and uniformly spiny; spines all equal. Flowering from April. Fruiting from July to August.

Near roads, on rubbish heaps and wastelands; very rare.—*European USSR*: Baltic States (Vilnius); *Caucasus*: southern Transcaucasia; *Soviet Central Asia*: Turkmenia (vicinity of Ashkhabad). *General distribution*: Worldwide, in countries with hot and temperate climates.

*Note*. According to data given in the American “Flora,” it is more widespread in America than *D. stramonium*. Most authors, especially American, support the hypothesis expressed already by P. Miller of a South or Central American origin of *D. tatula*, while *D. stramonium* is considered to have been introduced from the eastern hemisphere (see also note on preceding species).

According to Bernhardt, the color of the corolla and other characteristic features of *D. tatula* remain stable when it is grown from seeds.

*Economic importance*: A poisonous and medicinal plant; like *D. stramonium*, it contains the alkaloids hyoscyamine (in maximum quantity) and scopolamine but, according to available data (Wehmer), in a larger quantity; in flowering shoots 0.47–0.65%.

\**D. metel* L. Sp. pl. (1753) 179; ed. II (1762) 256, p.p; Roxb. Fl. Ind. 2 (1824) 238; Safford, Datur. Old World and New, 546.—*D. muricata* Bernh. Cat. sem. hort. Erfurt. and 1818, in Linnaea, VIII, Litt. Ber. (1833) 1.—*D. hummatu*  $\alpha$ . *muricata* Bernh. in Neue Journ. Pharm. XXVI (1833) 153; in Linnaea, VIII, 141.—*D. alba* Nees in Trans. Linn. Soc. XVII (1837) 73; Dun. in DC. Prodr. XIII, 1, 541.—*D. fastuosa* var. *alba* Hook. Fl. Brit. Ind. IV (1885) 242; Zolotnitskaja in Byull. Bot. sada Akad. Nauk ArmSSR, 10 (1951) 89.—*Stramonium fastuosum* fl. *albo* Moench, Meth. pl. (1794) 456.—*Ic.*: Wight, Ic. pl. Ind. or. III (1843–1845) tab. 852.

Annual. Plant bright green, 1–1.6 m tall. Stem branched, green (young stem sometimes purple at base), herbaceous, later woody at base, up to 2.5 cm thick, glabrous or sparsely puberulent. Leaves with petioles half as long as lamina, glabrous or sparsely puberulent; lamina 11–21 cm long, 8–20 cm broad (uppermost leaves on branches smaller), almost similar in color on both surfaces glabrous or, mainly when young, sparsely puberulent only along veins, more densely beneath, broadly

ovate, mostly with oblique, truncate or slightly cordate base and short-acuminate apex, with regularly sinuate-dentate margin, teeth acute or acuminate. Pedicels glabrous or puberulent. Calyx tubular, cylindrical, 113 not inflated, 5-angled, green, glabrous or puberulent, 5–9 cm long (about half as long as corolla), with 5 lanceolate acuminate teeth. Corolla 14–18 cm long, white, with 5 folds and 5 (rarely 6 or 8) short rounded teeth, sharply tapering into slender cusp, puberulent on outside like calyx but more sparsely. Capsule nodding, up to 4 cm long when ripe, subglobose, moderately or even sparsely tuberculate, usually ending in rather thick nonprickly 2.5–3 mm long tubercles. Seeds grayish, obliquely reniform, with 2 thickened borders parallel to outer margin, divided by grooves. Flowering from July to October. Fruiting from September to October.

Cultivated—in southern regions of the Caucasus and Soviet Central Asia. *General distribution*: India-Himalayas (apparently native), Indo-China, Sunda Islands, naturalized in the Mediterranean Region, Africa, and in America in tropical and subtropical zones. Described from cultivated specimens. The illustration of the plant under the name '*Hummatu*' in the book by Rheede (Rheede, Hort. Malab. (1678) Tab. 28) with analyses should be considered as the type.

*Note 1.* The question as to which species of the large-flowered daturas should be named *D. metel* L. has been repeatedly discussed in the literature. There is, however, no generally accepted opinion on this score as yet. Several authors, led by Safford, the monographer of the genus *Datura*, have correctly applied, in our opinion, the name *D. metel* to the Indian *Datura* ('*Hummatu*' Rheede). There are others, however, who blindly follow earlier authors (Bernhardi and Dunal) and apply this name to the South American *D. innoxia* Mill. (South and Central America). Sometimes, *D. meteloides* DC. from Central America is described under the name *D. metel*. The use of Linnaeus' name *D. metel* for different species of the section *Dutra* Bernh., which is a source of a very important alkaloid—scopolamine, often creates difficulties in the use of published data of chemical analyses. Moreover, the data given in the first edition of *Species plantarum* leave no doubt that Linnaeus was describing the Indian species under the name *D. metel*; this is proved by the diagnosis, reference to Rheede's diagram, and indication of the Asian origin of the species. If, in the second edition of *Species plantarum*, Linnaeus attributes the nontypical pubescent leaves (characteristic of *D. innoxia* and *D. meteloides*) to *D. metel*, it only shows that he has not represented his species very clearly, perhaps, by not differentiating it from the American *D. innoxia*, which is very similar in habit. This cannot be a reason for considering the latter as *D. metel* L., described earlier.

2. The double-petaled (with 2–3 whorls of petals inserted one inside another), white-flowered species cultivated in the Caucasus and Soviet Central Asia under the name *D. fastuosa* var. *alba* Hook. (= *D. alba* Nees) should be considered as a form of *D. metel* L.

- 114 The datura with double-petaled flowers, violet outside, also cultivated as an alkaloid plant under the name *D. fastuosa* L. var. *nigra*, does not differ substantially from the white, double-petaled form of *D. metel* except for the color of the corolla and is, perhaps, correctly considered, as by some authors (Bernhardi, Small), also a form of *D. metel* L.

*Economic importance:* *D. metel* L. is a very important medicinal plant, containing, in its seeds and leaves, the valuable therapeutic alkaloid, scopolamine—an isomer of cocaine. A study by S.J. Zolotnitskaja (l.c.) has shown that the double-petaled white form of *D. metel* contains 0.712% alkaloids in the leaves (in upper leaves up to 0.867%) in the form of scopolamine and hyoscyamine. According to Wehmer, flowers of *D. metel* were found to contain 0.51% scopolamine, 0.03% hyoscyamine, and 0.01% atropine; the seeds contain only hyoscyamine—0.041%; the proportion of these alkaloids may vary, depending on environmental conditions and the stage of plant development. The seeds contain a fatty oil consisting of 60–80% butyric acid, 23–55%  $\alpha$ -linoleic acid, 2.92%  $\beta$ -linoleic acid, and 1% phytosterol. The violet, double-petaled form (*D. fastuosa* L.), according to S.J. Zolotnitskaja's data, contained in its leaves 0.446–0.674% of alkaloids (in upper leaves up to 0.710%), on the average, under conditions similar to those prevalent in Yerevan.

\**D. innoxia* Mill. Gard. Dict. ed. VIII (1768) No. 5; Safford, Datur. Old World a. New, 549.—*D. metel* auct. non L.: Bernh. in Linnaea, VIII, Litt. Ber. (1833) 143; Dun in DC. Prodr. XIII, 1, 543; Boiss. Fl. or. IV. 292; Hook. Fl. Brit. Ind. IV, 243; O. and B. Fedtsch. Perech. rast. Turkest. 5, 243; Grossh. Opred. rast. Kavk. 298; Zolotnitskaja in Byull. Bot. sada Akad. Nauk ArmSSR, 10 (1951) 86.—*D. guayaquilensis* Kunth and Bonpl. Syn. pl. aequin. 3 (1824) 8.—*l.c.*: Bot. Mag. XXXV, tab. 1440.

Annual. Plant canescent (30)60–100(150) cm tall. Stem up to 3 cm thick, hollow, repeatedly branched, uniformly canescent with short and long patent hairs. Leaves 10–24 cm long and 5–18 cm broad, ovate or oblong-ovate, with truncate or cordate, generally oblique base, shallowly sinuate-dentate or partly sinuate or entire, both surfaces sparsely puberulent; petioles about half as long as lamina in lower leaves and 1/4 as long in upper leaves; petioles as well as leaf veins densely velutinous. Pedicels velutinous, erect. Calyx rather densely canescent, inflated in middle, with obscure veins, about 10 cm long, 1/2–2/3 as long as corolla, with 5 lanceolate-triangular slender mucronate teeth. Corolla 15–20 cm long white, limb 6–8.5 cm across, with 10 obtuse, not very prominent



- 115 or obscure teeth, and rather long slender cusp at tip. Capsule nodding, with calyx base recurved, ripe capsule (3)5–6 cm long, densely covered with slender, acerose, 8–11 mm long spines. Seeds obliquely reniform (lower end recurved) grayish ocher, 5 cm (sic) long, with borders parallel to outer margin, demarcated by thin groove. Flowering from July to October. Fruiting from first half of August.

Cultivated and naturalized in some places in Soviet Central Asia and the Caucasus. *General distribution*: Tropical part of South and Central America (native habitat); widely naturalized in the Mediterranean Region, North America, and all tropical countries. Described from specimens grown from seeds obtained from Veracruz (Mexico). Type, if preserved, in London.

*Note*. 1. This species is most often reported under the name *D. metel* L. (see note under preceding species).

2. Experiments are in progress in the cultivation of *D. meteloides* DC. (*D. wrightii* Rgl.), distinguished by smaller, shortly canescent leaves, bluish, broadly tubular strong-smelling flowers and a smaller capsule covered with shorter, needle-shaped spines on a slightly elevated base. Native of Central America.

*Economic importance*: *D. innoxia* Mill. is an ornamental and medicinal plant; it contains alkaloids: scopolamine, hyoscyamine, and atropine. Data provided by several authors show that the alkaloid content in its leaves varies from 0.381 to 0.886% and in the seeds from 0.23 to 0.5%; traces of hyoscyamine are higher than in *D. metel*. The findings of S.J. Zolotnitskaja show that *D. meteloides* DC. grown near Yerevan contains 0.690–1.093% of alkaloids in the leaves (up to 1.348% in upper leaves). Other data (Wimmer, Henry) show the total alkaloid content in the plant as a whole to be 0.4%; the relative content of scopolamine being less than in the other earlier mentioned species; a new alkaloid, meteloidine, has been discovered (Wehmer), in the plants. The content is 0.07%.

Tribe 5. NICANDREAE Wettst. in Engl. u. Pr. Pflanzenfam. IV, 3b (1895) 10.—Subtrip. *Nicandrinae* Baehni in Candollea, X (1943–1946) 483.—Calyx accrescent, completely enclosing fruit. Corolla regular. Stamens 5. Ovary divided into 5 unequal locules by false septa. Fruit dry, irregularly dehiscent berry.

### Genus 1322. *NICANDRA*<sup>1</sup> Adans.

Adans. Fam. II (1763) 219, nom. conserv.—*Pentagonia* Heist. ex Fabric. Enum. pl. hort. Helmstad. (1755) 184.—*Physalodes* Boehm. in Ludwig,

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<sup>1</sup> Named after the Greek physician Nicander, who lived in the second century B.C.



Defin. gen. pl. (1760) 42.—*Calydermos* Ruiz. and Pav. Fl. Per. II (1799) 43.

Calyx deeply 5-partite with lobes cordate-sagittate at base, accrescent  
116 corolla limb shallowly 5-lobed. Stamens with short filaments and anthers  
dehiscing by longitudinal slits. Fruit globose, a dry, 3- to 5-locular berry,  
enclosed within accrescent calyx. Annual with dentate or lobed leaves and  
large flowers.

Monotypic genus.

\**N. physaloides* (L.) Gaertn. De fruct. and sem. 11 (1791) 237, tab. 131, f. 2; Ldb. Fl. Ross. III, 186; Schmalh. Fl. II, 250; Grossh. Fl. Kavk. III, 351.—*Atropa physaloides* L. Sp. pl. ed. I (1753) 181.—*Physalis peruviana* Mill. Dict. ed. VIII (1768) No. 18, non L.—*P. daturaefolia* Lam. Encycl. méth. Bot. II (1786) 102.—*Calydermos erosus* Ruiz. and Pav. Fl. Per. II (1799) 43.—*Datura laevis* ? Hohenack. Enum. pl. Elisabethp. (1833) 220.—*Physalodes peruvianum* O. Ktze. Rev. gen. II (1891) 452.— *Ic.*: Rchb. Ic. fl. Germ. XX, tab. MDCXXVI, f. II; Fedtsch. and Fler. Fl. Evrop. Ross. fig. 763; Fl. Yugo-Vost. VI, fig. 621; Hegi, Illustr. Fl. Mittel-Eur. V, 4, f. 3395.

Annual. Stem 30–130 cm tall, erect, dichotomously branched, with ribbed glabrous branches. Leaves 4–10 cm long, 2.5–6.5 cm broad, ovate or elliptical, rarely rhombic-elliptical, acute, with cuneate base, sinuate-dentate, sometimes rather deeply sinuate-lobed, with equal teeth or lobes, upper surface mostly sparsely hairy; petiole  $1/2$ – $2/3$  as long as lamina. Flowers solitary, in stem bifurcations, leaf-opposed, drooping. Calyx 5-angled, somewhat inflated, strongly accrescent in fruit, with 5-winged ribs, membranous, reticulate-veined. Corolla about 1.5 cm long, with white tube, bluish, plicate, almost flat limb, and often with bluish spots at base, sometimes whitish outside with green calyx (f. *viridis* Bitter), rarely darker violet pigmentation on calyx and violet on stems (f. *violacea* Bitter); corolla lobes short, broad, obtuse, extended above. Stamens much shorter than corolla, equal, with filaments very densely pubescent at base. Style shorter than stamens, with capitate stigma; disk fleshy, crenate. Ripe berry dry, globose, brown, completely enclosed within calyx, irregularly dehiscing. Seeds numerous, brown, flat, orbicular-reniform. Flowering from July to September. Fruiting from August.

Introduced plant, naturalized in some places; weed in melon fields, vineyards, kitchen gardens, near roads. *European USSR*: almost all regions except the northern; *Caucasus*: all regions; *Western Siberia*: Upper Tobol (southwestern section); *Soviet Far East*: Ussuri; *Soviet Central Asia*: Syr Darya (Tashkent oasis), Tien Shan, Kara Kum (oases). *General distribution*: native of South America, naturalized in North America, Southeast Asia. Described from Peru. Type in London.

- 117 *Economic importance:* Cultivated occasionally as an ornamental plant. Sometimes used as a substitute for hops (contains lupulin) when preparing home-made yeast, and in the treatment of urinary diseases.

## Family CXLII. SCROPHULARIACEAE<sup>1</sup> LINDL.

Flowers bisexual, usually zygomorphic, rarely almost regular—slightly zygomorphic (*Verbascum*), usually 5-merous. Calyx 4–5 toothed or 4–5 partite, persistent. Corolla gamopetalous, imbricate, rotate, broadly campanulate or tubular, 4–5 lobed, rarely 6–8 lobed, spreading or bilabiate. Stamens 4 or 2, rarely 5, inserted on the corolla tube and alternating with its lobes, free, one or more stamens often sterile, sometimes one stamen reduced to sessile or short-stalked staminode; anthers bilocular, introrse, longitudinally dehiscent or with their sacs confluent at apex and dehiscent by single slit. Ovary superior, completely or partially bilocular, usually with several anatropous ovules in each locule, with axile placentation; style entire or bilobed. Fruit capsule, rarely berry. Seeds numerous, rarely some with fleshy endosperm and slightly curved embryo. Herbs, sometimes semiparasites, rarely parasites, sometimes shrubs or semishrubs, very rarely trees. Leaves alternate, opposite, or whorled, simple or compound, exstipulate.

The family includes nearly 200 genera and up to 3000 species, widely distributed all over the globe.

### KEY TO GENERA

1. Plant a parasite, without chlorophyll with reduced leaves, mostly parasitic on filbert roots (*Corylus*). ..... 1366. *Lathraea* L.
- + Plant with green leaves, autotrophic or semiparasitic ..... 2.
2. Corolla with spur or saccate base ..... 3.
- + Spur or saccate base absent, very rarely lower lip with two hollow umbos ..... 7.
3. Corolla saccate at base; corolla throat closed by palate of lower lip ..... 1329. *Antirrhinum* L.
- + Corolla with long or short spur ..... 4.
4. Leaves lobed, palmately veined; petiolate; corolla lilac, with orange patch in the throat; stems procumbent ... 1326. *Cymbalaria* Baumg.
- + Leaves pinnately veined or with one midrib ..... 5.
5. Flowers in terminal racemes or spikes; corolla throat closed ..... 1328. *Linaria* Mill.

<sup>1</sup> Family characteristics, subsections and the key to genera prepared by B.K. Schischkin.

- + Flowers solitary in leaf axils; capsule dehiscent by pores, slit or operculum; corolla throat almost open ..... 6.
- 6. Capsule dehiscent by pores or slit; leaves linear-lanceolate or oblong, three or more times as long as broad ..... 1330. *Chaenorrhinum* (DC.) Lge.
- + Capsule dehiscent by an operculum; leaves orbicular cordate or sagittate, nearly as long as broad ..... 1327. *Kicksia* Dum.
- 7. Stamens 2 ..... 8.
- + Stamens 5 or 4, two of them sometimes with underdeveloped anthers ..... 10.
- 8. Corolla with short tube and flat limb ..... 1341. *Veronica* L.
- + Corolla bilabiate, with entire or bifid upper lip and 2- to 3-partite lower lip ..... 9.
- 9. Annuals; calyx 5-fid; stem 30–70 cm tall ..... 1336. *Dopatrium* Hamilt.
- + Perennials; calyx parted on lower side up to base, with 2–3 teeth on opposite side; stems short, not exceeding 30 cm, often scapigerous ..... 1342. *Lagotis* Gaertn.
- 10. Corolla rotate, with short tube and broad flat limb ..... 11.
- + Corolla campanulate or globose-urceolate, with rather long tube, usually narrow or broadening above, often bilabiate, sometimes with flat limb ..... 13.
- 11. Stamens 5 ..... 1323. *Verbascum* L.
- + Stamens 4 ..... 12.
- 12. Capsule ovoid or oblong, early dehiscent, bilocular ..... 1324. *Celsia* L.
- + Capsule cylindrical, late dehiscent, almost 4-locular due to extremely prominent placentas ..... 1325. *Staurophragma* Fisch. and Mey.
- 13. Annual or biennial plants with rather slender root ..... 14.
- + Perennial plants with rather thick root ..... 31.
- 119 14. Plant 2–5 cm tall, acaulescent, all leaves in basal rosette; flowers solitary, on long pedicels, very small ..... 1338. *Limosella* L.
- + Plant larger, with leafy stem ..... 15.
- 15. Corolla bilabiate ..... 16.
- + Corolla not bilabiate, campanulate or with flat limb ..... 30.
- 16. Corolla tube inflated, subglobose; lobes of bilabiate corolla short, rounded, brown, reddish, brown or yellow .. 1331. *Scrophularia* L.
- + Corolla tube not inflated or (very rarely) inflated, but not globose .. ..... 17.
- 17. Upper corolla lip tapering into rather long beak (trunk) ..... 1360. *Rhynchocorys* Griseb.
- + Upper corolla lip not tapering into peak (trunk) ..... 18.

18. Pedicels, especially in lower flowers, longer than calyx, sometimes several times longer ..... 19.  
 + Pedicels shorter than calyx ..... 22.
19. Leaves entire ..... 1340. *Lindernia* All.  
 + Leaves somewhat dentate ..... 20.
20. Leaves broadly ovate, sometimes suborbicular, with lamina sharply narrowed into short petiole; anthers coherent near upper lip (introduced plant) ..... 1339. *Vandellia* L.  
 + Leaves oblong or lanceolate, gradually narrowed toward base, sessile; anthers free (Soviet Far East) ..... 21.
21. Stem profusely branched in upper half; branches opposite, almost horizontal ..... 1353. *Omphalothrix* Maxim.  
 + Stem simple or moderately branched, with oblique alternate branches ..... 1334. *Mazus* Lour.
22. Leaves entire ..... 1349. *Melampyrum* L.  
 + Leaves dentate, crenate, serrate, or pinate ..... 23.
23. Leaves once or twice pinnatisect (Soviet Far East) ..... 24.  
 + Leaves dentate, crenate, or serrate, very rarely deeply incised .. 25.
24. Flowers with bracteoles; calyx limb almost bilabiate, upper lip 3-partite, lower 2-partite, lobes entire; corolla yellow or purple, slightly longer than calyx ..... 1362. *Siphonostegia* Benth.  
 + Flowers ebracteolate; calyx campanulate, 5-lobed, lobes pinnately dentate; corolla pink, with yellow spots in throat, 2-3 times longer than calyx, tube inflated ..... 1351. *Phtheirospermum* Bge.
25. Calyx inflated, laterally compressed, accrescent; corolla yellow, upper lip laterally compressed ..... 1359. *Rhinanthus* L.  
 + Calyx tubular-campanulate, not inflated, not accrescent, upper lip gibbous, not compressed ..... 26.
- 120 26. Capsule ovoid, slightly swollen ..... 1358. *Bellardia* All.  
 + Capsule not swollen ..... 27.
27. Seeds smooth, capsule oblong or lanceolate .....  
 ..... 1354. *Parentucellia* Viv.  
 + Seeds longitudinally grooved ..... 28.
28. Flowers white or pale lilac; leaves ovate or broadly ovate, short-acuminate, serrate-dentate ..... 1352. *Euphrasia* L.  
 + Flowers dull pink or yellow, leaves sparsely denticulate ..... 29.
29. Anthers generally hairy, vertical; flowers dull pink, very rarely yellow ..... 1356. *Odontites* Zinn.  
 + Anthers glabrous, horizontal; flowers yellow .....  
 ..... 1355. *Ortantha* (Benth.) Kern.
30. Corolla purple; plant generally pubescent, turning black .....  
 ..... 1346. *Leptorhabdos* Schrenk.



- + Corolla yellow or whitish; plant glabrous (Caucasia) ..... 1347. *Rhampficarpa* Benth.
- 31. Plant acaulescent; all leaves in basal rosette; flowers on short pedicels, solitary ..... 1343. *Nathaliella* B. Fedtsch.
- + Plant with well-developed leafy stem; flowers few or numerous .... 32.
- 32. Corolla campanulate or globose-urceolate ..... 33.
- + Corolla with rather long narrow tube, limb bilabiate, rarely flat .... 36.
- 33. Leaves alternate ..... 34.
- + Leaves opposite or whorled ..... 35.
- 34. Calyx deeply 5-partite almost to base; bracteoles absent; flowers in racemes; capsule as long as calyx or longer ..... 1345. *Digitalis* L.
- + Calyx with five teeth not exceeding 1/3 of its length; flowers with two bracteoles; capsule shorter than calyx ..... 1344. *Spirostegia* Ivan.
- 35. Corolla tube inflated, subglobose, lobes short, rounded, brown, reddish brown or yellow; corolla not exceeding 1 cm in length ..... 1331. *Scrophularia* L.
- + Corolla broadly campanulate, about 3 cm long, lilac ..... 1332. *Pentastemon* L' Herit.
- 36. Upper corolla lip tapering into long beak (trunk) ..... 1360. *Rhynchocorys* Griseb.
- 121 + Upper corolla lip not tapering into beak ..... 37.
- 37. Upper corolla lip flat, erect or recurved ..... 38.
- + Upper corolla lip galeate or scaphoid, gibbous or longitudinally folded and laterally compressed ..... 42.
- 38. Flowers axillary, only uppermost sometimes in racemes; corolla variously colored, but never dark violet ..... 39.
- + Flowers in loose clusters; corolla dark violet (sometimes turning black on drying) ..... 41.
- 39. Ovary with two ovules in each locule; capsule often one-seeded (Carpathians) ..... 1350. *Tozzia* L.
- + Ovary with many ovules in each locule; capsule usually many seeded ..... 40.
- 40. Calyx with two linear bracteoles at base; corolla with yellowish tube and white limb; of 4 stamens, the lower two sterile ..... 1337. *Gratiola* L.
- + Calyx ebracteolate; corolla yellow; all stamens fertile (Soviet Far East) ..... 1333. *Mimulus* L.
- 41. Stem with branches spreading from the base; leaves caducous, capsule indehiscent (Soviet Central Asia) ..... 1335. *Dodartia* L.
- + Stem simple or with short appressed branches; leaves long persistent; capsule dehiscent ..... 1334. *Mazus* Lour.

42. Calyx with 5(10) teeth or lobes ..... 43.  
 + Calyx with 4 (rarely 2) segments or lobes ..... 45.
43. Flowers crowded at stem apex in long inflorescence; leaves usually pinnatisect (rarely dentate); calyx 5-toothed; lower corolla lip without umbos ..... 1361. *Pedicularis* L.  
 + Flowers solitary in axils of middle or lower leaves; leaves linear-lanceolate, entire, calyx with subulate appendages between teeth, apparently 10-toothed; lower corolla lip with two hollow umbos .. 44.
44. Flowers in axils of middle three segmented leaves on 4–5 mm long pedicels; calyx 5(6)-lobed, with additional lobes in between; upper corolla lip bilobed ..... 1364. *Cymbria* L.  
 + Flowers in axils of flower entire leaves on 1 to 2 mm long pedicels; calyx 5-lobed (additional lobes absent); upper corolla lip entire ....  
 ..... 1365. *Cymbochasma* (Endl.) Klok. and Zos.
45. Flowers with two small bracteoles below the calyx .....  
 ..... 1363. *Bungea* C.A.M.  
 + Flowers ebracteolate ..... 46.
46. Corolla violet-purple; calyx tubular, not laterally compressed, leaves opposite ..... 1357. *Bartsia* L.  
 + Corolla not violet-purple; calyx laterally compressed, leaves alternate, only lowermost opposite ..... 1348. *Castilleja* L.f.

Subfamily I. PSEUDOSOLANOIDEAE Wettst. in Pflanzenfam. IV, 3b (1895) 50.—Two posterior corolla lobes slightly overlapping lateral lobes. Leaves alternate. Stamens generally 5.

Tribe 1. VERBASCEAE Benth. in DC. Prodr. X (1896) 229.—Corolla rotate, almost regular, stamens generally 5, divergent, anther sacs converging, unilocular; leaves alternate.

### Genus 1323. *VERBASCUM*<sup>1, 2</sup> L.

L. Gen. pl. ed. 5 (1754) 83; Schrader, Monogr. gen. Verbasc. (1813–1823); Franchet. Etude Verbasc. (1875); Murbeck, Monogr. d. Gatt. Verbascum (1933).

Calyx deeply 5-partite. Corolla regular or nearly so, generally yellow, with very short indistinct tube and 5-lobed, slightly concave or almost flat limb. Stamens 5, in some species the fifth (posterior) stamen not developed, filaments either all similar, with papilliform hairs, or filaments of 2 anterior stamens differing from posterior ones in length and

<sup>1</sup> Treatment by B.A. Fedtschenko.

<sup>2</sup> Modified form of *barbascum*, from the Latin, *barba*—beard, referring to the pubescence of the plant.

pubescence; anthers all similar or those of 2 anterior stamens oblong-linear, decurrent on filaments. Style filiform or thickened above. Ovary bilocular, generally with many ovules. Capsule globose or oblong. Seeds small, usually with five transverse rows of pits. Perennial herbs, rarely semishrubs, with opposite, generally entire leaves. Flowers borne singly or in clusters in racemes or panicles.

### KEY TO SECTIONS AND SUBSECTIONS

1. Flowers in clusters of 2–7, rarely partly (mainly in upper part of inflorescence) borne single (section 1. *Fasciculata* Murb.) .....2.
  - + Flowers always borne single, mostly on rather long pedicels .....  
.....Section 2. *Singuliflora* Murb.
  2. Anthers dissimilar: oblong, decurrent on filaments in two anterior stamens .....Subsection 1. *Heterandra* Franch.
  - + Anthers similar, reniform in all stamensSubsection 2. *Isandra* Franch.
- 123      Section 1. *Fasciculata* Murb. Monogr. 32. Flowers few in clusters, sometimes borne singly in upper part of inflorescence. Seeds with transverse rows of pits.

Subsection 1. *Heterandra* Franch. ex Murb. Monogr. 32.—Anthers of two anterior stamens decurrent on filaments.

1. Cauline leaves extremely decurrent .....2.
- + Cauline leaves nondecurrent or almost so .....3.
2. Corolla 30–50 mm across; pedicels not adnate to inflorescence axis .....4. *V. thapsiforme* Schrad.
- + Corolla 15–25 mm across; pedicels adnate to inflorescence axis .....  
.....5. *V. thapsus* L.
3. Flowers sessile or subsessile .....3. *V. sessiliflorum* Murb.
- + Flowers pedicellate .....4.
4. Bracts usually longer than flowers, linear-lanceolate; pedicel of primary flower in cluster up to 10–12 mm long ..... 2. *V. georgicum* Benth.
- + Bracts ovate, not longer than flowers; pedicels usually shorter than flowers .....1. *V. phlomoides* L.

1. *V. phlomoides* L. Sp. pl. (1753) App. 1194; Sp. pl. 2, 253; Ldb. Fl. Ross. III, 194; Boiss. Fl. or. IV, 301; Schmalh. Fl. II, 257; Grossh. Fl. Kavk. III, 360; Murb. Monogr. 51; Kryl. Fl. Zap. Sib. 2412.—Ic.: Schrad. Monogr. I, tab. I, f. 2; tab. II, tab. III; Rchb. Ic. fl. Germ. XX, tab. 18, f. II, 19, 20.—Exs.: Billot, Fl. gall. and germ. No. 4056.

Biennial. Stem 50–150 cm tall, erect, cylindrical, leafy, uniformly densely gray or yellow-tomentose, sometimes branched near apex. Leaves also densely tomentose, less so on upper surface; radical leaves petiolate,

petioles about half as long as lamina; lamina 15–25(35) cm long, 4–10 cm broad, oblong-elliptical, subobtuse, coarsely crenate; lower cauline leaves short petiolate or sessile, oblong or obovate-oblong; middle cauline leaves sessile, ovate, acute, subcordate at base, mostly with auricle on each side, sometimes short-decurrent; upper leaves broadly ovate, mucronate, with auricles at base, sometimes slightly decurrent. Inflorescence rather dense, spicate raceme, often with lateral branches. Flowers in clusters of 3–4(8). Lower bracts with cordate base, broadly ovate or ovate-  
 124 triangular; other bracts ovate-lanceolate; all bracts acuminate. Pedicels not adnate to inflorescence axis; pedicel of first (lower) flower in cluster somewhat thicker, equaling calyx or a little shorter, 4–9 mm long, with two bracteoles at base; pedicels of other flowers shorter. Calyx divided almost up to base; lobes ovate-lanceolate or lanceolate, acute or short-acuminate. Corolla yellow, 35–55 mm across, flat, generally without pellucid glands, stellate-hairy outside. Two anterior stamens entirely glabrous, three posterior ones densely covered with yellowish papilliform hairs; anthers of two anterior stamens half as long as their filaments, long decurrent. Style sparsely pubescent at base, thickening upward. Capsule broadly ellipsoid-ovoid, 5–8 mm long, obtuse, or obscurely apiculate. June to August.

Primarily on the slopes of sandy hills, in steppes, among scrub, in river valleys and also as weed; found drifted far to the north and east of the original area of distribution. *European USSR*: Upper Volga (Yaroslavl, Kalinin, in farmyards, Serpukhov, in farmyards), Volga-Kama (near Sovetsk town, near the port), Upper Dnieper, Middle Dnieper, Volga-Don, Bessarabia, Black Sea Region, Crimea; *Caucasus*: Ciscaucasia, Dagestan, western, eastern and southern Transcaucasia; *Western Siberia*: Ob' Region (Tagilsk factory); *Soviet Central Asia*: Balkhash Region (cited by E. Regel from the collections of Semenov in Tien Shan, but the specimen is more related to *V. thapsus* L.). *General distribution*: Central Europe, Mediterranean Region, Balkan States (including the islands of archipelago of the Aegean Sea), Armenia—Kurdistan (reported from Olty District). Described from Southern Europe. Type in London.

*Economic importance*: The corolla of the plant, after removing the calyx, as from some other large-flowered species of mullein (*V. thapsiforme* Schrad., *V. songoricum* Schrenk.), is used in medicine. It contains traces of essential oil, fats, free acids (malic and phosphoric), mucilage, yellow pigment, potassium acetate and other salts.

2. *V. georgicum* Benth. in DC. Prodr. X (1846) 228; Ldb. Fl. Ross. III, 195; Boiss. Fl. or. IV, 316; Grossh. Fl. Kavk. III, 361; Murb. Monogr. 492; Nachtr. Monogr. Verbasc. 20.—*V. sceptrum* Schmalh. in Ber. deutsch. bot. Gesellsch. X (1892) 291; Grossh. I. c., 360; Murb. Monogr. 67.



Biennial. Plant grayish-green throughout. Stem 80–170 cm tall, rather thick, erect, leafy, angular at least in upper part, soft-tomentose, later somewhat glabrescent, simple or with 1–2 short branches in the inflorescence. Radical leaves subsessile or short-petiolate, lamina 20–40 cm long, 8–11 cm broad, oblong-lanceolate, subacute, crenate-dentate, base narrow-cuneate, upper surface green, gray pilose beneath; 125 lower and middle cauline leaves lanceolate, acute or acuminate, crenate or crenate-dentate; upper leaves broad-ovate with rounded base, sharply tapering to a point. Inflorescence long terminal raceme, sometimes with 1–2 branches; flowers in clusters of 4–7, generally crowded; inflorescence axis sparsely tomentose. Lower bracts ovate, others narrow-lanceolate, tomentose and diffusely glandular, equaling or exceeding floral clusters. Pedicel of primary flower in cluster 5–12 mm long, with two large linear bracteoles; pedicels of other flowers shorter. Calyx 7–8 mm long initially, finally up to 12 mm, densely soft villous and glandular, divided almost to base with lanceolate lobes. Corolla yellow, 25–35 mm across, without pellucid glands, finely tomentose outside. Filaments of two anterior stamens glabrous rarely white-ciliate; filaments of posterior stamens covered with white papilliform hairs; anthers of two anterior stamens decurrent. Style densely tomentose above; stigma oblong-spatulate, long decurrent; capsule subglobose, subobtuse, apiculate, long decurrent; capsule subglobose, subobtuse, apiculate, 6–9 mm long, glabrescent, equaling calyx or a little shorter. June to August.

In forest glades, on stony slopes and in forests.—*Caucasus*: western, eastern and southern Transcaucasia. *General distribution*: Armenia-Kurdistan. Described from the Caucasus in Prescott's collections (1831); exact location not mentioned. Type in London.

Hybrids: *V. georgicum* × *speciosum* [= *V. sceptrum* × *speciosum* (?) = *V. arpatzaicum* Bordz.], *V. georgicum* × *songoricum* [= *V. sceptrum songoricum* Murb.], *V. georgicum* × *hajastanicum*. = *V. hajastanicum* × *sceptrum* Oliv.), *V. georgicum* × *varians*.

*Note*. Koch [Linnaea, XXII (1849) 720], in passing describes '*V. vimineum* Cyr. Pl. rar. p. 101, t. 21' without indicating a precise location. He based it on a Murbeck (Monogr. 69) specimen; this specimen, preserved in the Berlin herbarium, has 'Schemachi' written on the label and, according to Murbek, is the same as *V. sceptrum* Schmalh. (= *V. georgicum* Benth.). However, Cyrillo's work, published in 1788–1792, does not describe any *Verbascum*; obviously Koch had in mind the work of Gussone, *Plantae rariores* (1826), in which he described the new species *V. viminale* Guss., but this has nothing in common with the Caucasian *V. sceptrum* Schmalh. (*V. georgicum* Benth.). The identity of *V. georgicum*

Benth. with *V. sceptrum*, widely distributed in Transcaucasia, was established by Murbeck in his subsequent (after the publication of his monograph on the genus *Verbascum*) studies (Nachtr. Monogr. Verbasc. 20).

3. *V. sessiliflorum* Murb. Monogr. (1933) 69.—*V. ponticum* Fisch. and Mey. (inedit. in Herb. Inst. Bot. Acad. Sc. Leningrad).—*lc.*: Murb. l.c. tab. I.

126 Biennial. Plant gray-tomentose throughout. Stem 50–80 cm tall, erect, cylindrical, leafy, simple, sometimes poorly branched above. Upper surface of leaves green with short branched hairs in addition to very fine glandular hairs, lower surface gray—or yellowish tomentose, with very prominent veins; radical leaves with 2.5–4 cm long petioles, lamina 5–12 cm long, 3–6 cm broad, ovate-elliptical, obtuse or subobtuse, rounded at base, remotely sinuate or crenate; middle cauline leaves sessile or subsessile, oblong-ovate, subobtuse or sharply acuminate, crenate or sinuate; upper leaves cordate-ovate, mucronate, subamplexicaul. Inflorescence terminal, dense, spicate raceme, sometimes branched; axis densely grayish yellow tomentose, eglandular. Flowers in clusters crowded at first, later, at least lower ones somewhat spaced; each cluster usually with one primary and one additional flower, but lower clusters sometimes with 3–4 flowers and upper with only a single flower each. Bracts of lower floral clusters orbicular-cordate, almost exceeding them; others somewhat broadly ovate, shorter than clusters; all bracts short-acuminate, with glandular-hairy margin and upper surface, tomentose beneath; primary flower in cluster sessile or on 1–2 mm long pedicel, with 2 bracteoles, nearly equaling calyx lobes; other flowers sessile. Calyx 7–10 mm long, divided up to base into oblong-lanceolate or oblong lobes, glandular-hairy inside and along margins, tomentose outside. Corolla yellow, 18–25 mm across, with pellucid glands, densely and softly tomentose outside. Filaments of anterior stamens usually glabrous, thicker, those of three posterior stamens with dense white papilliform hairs; anthers of two anterior stamens oblong-linear, long decurrent. Style sparsely tomentose at base, thickened above. Capsule broadly ellipsoid-ovoid, 5–6 mm long, obtuse, apiculate, densely tomentose, slightly shorter than calyx.

On sea shores.—*Caucasus*: western Transcaucasia (Pitsunda). Endemic. Described from the place indicated. Type in Leningrad.

*Note.* This plant was recognized as a separate species (*V. ponticum* Fisch. and Mey.) by Fischer and Meyer about a hundred years ago from cultivated specimens grown at St. Petersburg Botanical Gardens from seeds obtained from Redut-Kale (Poti, Caucasian shores of the Black Sea).

4. *V. thapsiforme* Schrad. Monogr. I (1813) 23; Ldb. Fl. Ross. III, 194; Boiss. Fl. or. IV; Schmalh. Fl. II, 256; Grossh. Fl. Kavk. III, 360;

Murb. Monogr. 85.—*V. cuspidatum* Schrad. l.c. 23.—*l.c.*: Schrad. l.c. tab. I, f. 1.—*Exs.*: Fries, Herb. norm. V, No. 19–20; Fl. pol. exs. 977; GRF, No. 1124.

Annual. Plant densely covered throughout with soft grayish or yellowish gray tomentum. Stem 20–120 cm tall, thick, leafy, simple, rarely weakly branched above. Radical leaves sessile or with 2–5 cm long petioles, several times shorter than lamina, latter 10–40 cm long, 4–10 cm broad, oblong or oblong-elliptical, coarsely crenate, gradually narrowed toward base; cauline leaves all decurrent; lower oblong, acute, crenate-serrate. With auricles at base; upper cauline leaves ovate or ovate-lanceolate, acuminate or cuspidate, serrate-dentate, decurrent on stem. Inflorescence dense terminal raceme, rarely with short lateral branches; flowers (2)3–4(8) together in clusters. Lower bracts ovate with cuneate base, long decurrent, upper narrowly lanceolate, usually exceeding floral clusters. Pedicels of primary flower in cluster nearly half as long as calyx, 3–7 mm long, somewhat thick, its lower part partially adnate to inflorescence axis, with two linear-lanceolate bracteoles at base; pedicels of other flowers very short. Calyx 6–12 mm long, 5-partite almost to base, with ovate-lanceolate, lanceolate, long-acuminate lobes. Corolla yellow, 35–50 mm across, almost without pellucid glands, stellate-hairy outside. Filaments orange, the two anterior usually glabrous; filaments of posterior stamens densely covered with yellowish papilliform hairs; anthers of two anterior stamens oblong, slightly shorter than filaments, long decurrent. Style sparsely pubescent at base, thickened above; stigma spatulate, long decurrent. Capsule ellipsoid-obovoid, 5–8 mm long, obtuse, obscurely apiculate or not, densely pubescent, shorter than calyx. June to July.

In pastures, along forest edges, mainly in sandy soil.—*European USSR*: Baltic States (near Riga), Upper Volga, Upper Dnieper (Pinsk), Upper Dniester, Middle Dniester, Volga-Don, Bessarabia, Black Sea Region, Crimea, Lower Don; *Caucasus*: Ciscaucasia (Stavropol), Dagestan, western Transcaucasia, eastern Transcaucasia (Tbilisi?). *General distribution*: Scandinavia (south), Atlantic coastal and Central Europe, Mediterranean Region (doubtful in Italian mountains, rarely in Spain; isolated locations in Spanish Morocco). Described from Germany. Type not known.

*Note.* The distribution of this species in Caucasus has not been accurately established; we have taken the aforementioned data from Grossheim (l.c.). I saw only the following specimens in the herbarium: 1) Taman peninsula, village of Golubinskaya, E.V. Shiffers-Rafalovich; this plant is probably related to *V. phlomoides* L., since decurrent leaves are absent in it; 2) Abastuman, I. Akinfiyev; similar to sturdy specimens of *V. thapsus* L.



128 Further, a specimen is available, identified as *V. thapsiforme*  $\times$  *lychnitis*, also from the Taman peninsula, village of Golubinskaya. I assume that even this plant probably is the hybrid *V. lychnitis*  $\times$  *phlomoides*.

5. *V. thapsus* L. Sp. pl. (1753) 177; Ldb. Fl. alt. III, 193; Boiss. Fl. or. IV, 301; Schmalh. Fl. II, 256; Grossh. Fl. Kavk. III, 360; Murb. Monogr. 120; Kryl. Fl. Zap. Sib. IX, 1416.—*V. schraderi* G.F.W. Mey. Chloris Hannover (1836) 325.—*l.c.*: Fl. Dan. IV, tab. 631; Rchb. Ic. fl. Germ. XXII, tab. 16.—*Exs.*: Rchb. Fl. Germ. Exs. No. 635; Fries, Herb. norm. XVI, No. 20; Fl. austro-hung. exs. No. 1740.

Biennial. Plant densely covered with persistent, ash-white, rarely light yellowish, tomentum, eglandular. Stems erect, leafy, more or less winged. Radical leaves with 3–6 cm long petioles; lamina oblong, 15–30 cm long, 5–10 cm broad, obtuse or short-mucronate, crenae or subentire; cauline leaves with shorter petioles or sessile, decurrent; upper leaves sessile, short, acuminate. Inflorescence dense, terminal spicate raceme, subcylindrical, unbranched; flowers in clusters of 4–7 in lower part of raceme, of 1–4 in the upper part. Bracts rounded at base, lanceolate, acuminate, shorter than floral cluster in fruit. Pedicels thick, short, almost adnate to inflorescence axis. Calyx divided almost to base, with lanceolate lobes. Corolla yellow, 12–20 mm across, with very distinct pellucid glands. Stamens 5, all fertile; filaments of two anterior stamens at early flowering stage suberect, slightly longer and thicker than filaments of other stamens, glabrous or white-villous; anthers of two anterior stamens shortly decurrent. Style filiform. Capsule ellipsoid or obovoid, slightly longer than calyx. June to July.

In open places, mainly on sandy soils, cliffs and along river banks.—*European USSR*: Dvina-Pechora (northward up to Vologda, Ustyug and Syktyvkar), Ladoga-Ilmen (northward up to Petrozavodsk), Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Trans-Volga Region, Bessarabia, Upper Dniester, Lower Don (?), Lower Volga, Crimea; *Caucasus*: all regions; *Western Siberia*: Altai (south); *Eastern Siberia*: Yenisey (near Eniseisk); *Soviet Central Asia*: Balkhash Region, Dzh.-Tarbagatai, Kara Kum (near Krasnovodsk), Pamiro-Alai, Tien Shan. *General distribution*: Scandinavia (southern part), Atlantic coastal regions of Europe, Mediterranean Region, Balkan States-Asia Minor, China (Szechwan, Yunnan); introduced in Japan and the USA (many states). Described from Europe. Type in London.

129 *Note*. Widely distributed in the USSR, this plant sometimes shows striking variations in habit, by the appearance of short lateral branches in the inflorescence, each ending in a short inflorescence in lower leaf axils. Finally, specimens are available where the stem shows the phenomenon of faciation:-



Subsection 2. *Isandra* Franch. ex Murb. Monogr. (1933) 33.—Anthers all similar, reniform.

1. Filaments with white or yellowish white papilliform hairs ..... 2.
- + Filaments with violet papilliform hairs ..... 19.
2. Branches of inflorescence distinct, 3–5 cm long; peduncles terminating in several pedicellate flowers; each pedicel with 2 bracteoles ..... 30. *V. szovitsianum* Boiss.
- + Flowers in clusters without common peduncle; upper flowers sometimes solitary ..... 3.
3. Flowers sessile or subsessile ..... 4.
- + Flowers with rather long pedicels ..... 5.
4. Leaves pinnatifid or pinnatipartite ..... 13. *V. pinnatifidum* Vahl
- + Leaves subentire; corolla with distinct tube and limb ..... 6. *V. glomeratum* Boiss.
5. Inflorescence spicate raceme, sometimes with additional branches at base ..... 6.
- + Inflorescence paniculate ..... 10.
6. Young plant white-tomentose, pubescence shedding in flakes ..... 7.
- + Plant densely grayish yellow pubescent, not white and not shedding in flakes ..... 15. *V. stachydiforme* Boiss and Bushe.
7. Cauline leaves more or less decurrent ..... 8.
- + Cauline leaves not decurrent ..... 9.
8. Capsule broadly ovoid; radical leaves long-petiolate ..... 16. *V. turkestanicum* Franch.
- + Capsule oblong-cylindrical; radical leaves subsessile or short-petiolate ..... 22. *V. gossypinum* M.B.
9. Inflorescence axis distinctly thickened, capsule  $1\frac{1}{4}$ – $1\frac{1}{3}$  as long as calyx ..... 18. *V. eriorrhodon* Boiss.
- + Inflorescence axis not thickened; capsule either not exceeding calyx or scarcely so ..... 17. *V. gnaphalodes* M.B.
10. Calyx 6–7 mm long, exceeding or equaling capsule ..... 8. *V. songoricum* Schrenk.
- + Calyx not longer than 5 mm, shorter than capsule. .... 11.
11. Leaves narrowed at both ends, entire ..... 12.
- 130 + Leaves not narrowed at both ends, not entire ..... 14.
12. Leave oblong; pubescence not dense ..... 13.
- + Leave oblong-lanceolate, densely pubescent ..... 11. *V. megaphlomos* (Boiss. and Heldr.) Hal.
13. Upper cauline leaves extremely crispate . 10. *V. speciosum* Schrad.
- + Upper cauline leaves not or very slightly crispate ..... 12. *V. cheiranthifolium* Boiss.

14. Upper part of filaments and connective of anterior stamens glabrous ..... 15.
- + Upper part of filaments and connective of anterior stamens covered with papilliform hairs ..... 18.
15. Stem and branches cylindrical; leaves with scattered branched hairs along veins on the upper surface, loosely tomentose beneath ..... 20. *V. turcomanicum* Murb.
- + Stem and branches ribbed-angular; upper surface of leaves with appressed stellate hairs ..... 16.
16. Plant about 1 m tall or more; leaves green on upper surface, glaucous beneath; cauline leaves gradually reduced upward (plant of southern steppe of European part of the USSR) ..... 19. *V. lychnitis* L.
- + Plant 40–60 cm tall (native, exclusively, to frontier regions adjoining southwestern Caucasia, near Artvinsk district) ..... 17.
17. Lower leaves ovate; cauline leaves much smaller; upper surface of all leaves glabrous ..... 14. *V. artvinense* Wulff.
- + Lower leaves with cuneate base, oblong, gray-pubescent on both surfaces ..... 31. *V. cedreti* Boiss.
18. Pedicel of primary flower in cluster scarcely longer than calyx; leaves entire or obscurely crenate ..... 7. *V. bactrianum* Bge.
- + Pedicel of primary flower in cluster much longer than calyx; leaves narrowly lanceolate, sometimes with small lacinules along margin at base ..... 9. *V. banaticum* Roch.
19. Radical leaves sinuate-lobed ..... 21. *V. sinuatum* L.
- + Radical leaves entire, finely crenate or dentate, but not sinuate-lobed ..... 20.
20. Corolla glabrous outside; pedicels slender, longer, glabrous ..... 35. *V. alpigenum* C. Koch.
- + Corolla pubescent outside; pedicels thicker, shorter, pubescent .. 21.
- 131 21. Calyx lobes broadly lanceolate, 5–7 mm long; pedicels about 10 mm long; capsule globose ..... 29. *V. wilhelmsianum* C. Koch.
- + Calyx lobes shorter, much narrower; pedicels shorter ..... 22.
22. Upper part of stem and inflorescence glandular-pubescent ..... 29.
- + Plant not glandular-pubescent ..... 23.
23. Inflorescence flexuous, sparsely branched; branches virgate ..... 25. *V. flexuosum* Wulff.
- + Inflorescence not flexuous ..... 24.
24. Stamens 5 ..... 25.
- + Stamens generally 4 ..... 34. *V. transcaasicum* Wulff.
25. Inflorescence simple, rather dense raceme; sometimes with short lateral branches ..... 28. *V. nigrum* L.
- + Inflorescence somewhat branched ..... 26.

26. Inflorescence paniculate; upper leaf surface green ..... 27.  
 + Inflorescence with virgate branches ..... 28.  
 27. Flowers larger, 20–25(30) mm across; cauline leaves few, gradually reduced upwards (southern steppe of European USSR and mountains of Kazakhstan) ..... 26. *V. orientale* M.B.  
 + Flowers smaller, 10–15(20) mm across; cauline leaves numerous, of almost same size ..... 27. *V. laxum* Filar and Jav.  
 28. Pedicels greatly thickened in fruit; capsule 2–3 times as long as calyx ..... 31. *V. cedreti* Boiss.  
 + Pedicels not thickened in fruit; capsule not more than 1½ times as long as calyx ..... 24. *V. varians* Freyn and Bornm.  
 29. Inflorescence simple, rather dense raceme ..... 23. *V. hajastanicum* Bordz.  
 + Inflorescence virgate, branched ..... 30.  
 30. Bracts as long or longer than pedicels in fruit ..... 32. *V. erivanicum* Wulff.  
 + Bracts shorter than pedicels in fruit ..... 33. *V. paniculatum* Wulff.

6. *V. glomeratum* Boiss. Diagn. pl. or I, 4 (1844) 59; Fl. or. IV, 309; Grossh. Fl. Kavk, III, 365; Murb. Monogr. 203.

Biennial. Entire plant densely tomentose with rather coarse yellowish gray hairs. Stem 100–200 cm tall, up to 15 mm thick, cylindrical, densely leafy, broadly branched above. Leaves all entire, lower ones with flat margin; radical leaves with 3–8 cm long petiole, lanceolate or oblong-  
 132 ovate, 20–30 cm long, 8–10 cm broad, gradually narrowed toward base, sharply tapering toward apex; lower cauline leaves sessile, oblong-ovate; upper leaves ovate or cordate-deltoid subamplexicaul, sharply tapering above into a mucro. Flowers 2–4(6) in each cluster, not crowded. Bracts orbicular-ovate, mucronate, shorter than floral clusters. Pedicel of primary flower in the cluster 2.5–5 mm long, later thickened, very strong, with two bracteoles at base; pedicels of other flowers very short. Calyx initially 8–10 mm long, finally reaching 12 mm, divided into narrowly lanceolate acute lobes for 4/5 of its length. Corolla yellow, with distinct cylindrical tube, limb 30–60 mm across, without pellucid glands, rough outside due to stellate hairs, corolla tube up to 3 mm long. Filaments of all stamens broad at base, with white papilliform hairs all over; anthers similar, reniform; connective with long papillae. Style sparsely tomentose at base. Capsule globose-ovoid, 5–5.5 mm long, densely stellate-tomentose, much shorter than calyx.

*Caucasus*: eastern Transcaucasia (Tbilisi ?). *General distribution*: Asia Minor; introduced in southern France (Montpellier). Described from environs of Smyrna. Type in Geneva.

*Note*. This plant is reported from Georgia by Wulff and Grossheim without mentioning the nearest locality. Neither I nor Murbeck have seen herbarium specimens of this Caucasian species and, therefore,

the determination of Wulff and Grossheim remains unconfirmed. The description given by us is compiled on the basis of authentic specimens from Asia Minor.

7. *V. bactrianum* Bge. in Mém. Sav. étrang. Acad. Pétersb. VIII (1851) 422.—*V. sinaiticum* Murb. Monogr. 234, p.p.—*V. capusi* Franch. in Ann. Sc. Nat. Bot. sér. VI, XVIII (1883) 129. *V. sinaiticum* var. *bactrianum* Murb. Nachtr. Monogr. Verbasc. (1936) 34.

Biennial. Plant densely covered throughout with gray or yellowish tomentum, glandular hairs absent. Stem 60–150 cm tall, erect, cylindrical, leafy. Radical leaves petiolate; petioles 1/6–1/3 as long as lamina; lamina 12–15(40) cm long, 3–4(12) cm broad, oblong or oblong-ovate, obtuse or subacute, subdentate or serrate-crenate, rarely entire, cuneate, or rounded at base; cauline leaves similar but with shorter petioles or sessile, upper leaves broadly triangular-ovate or suborbicular, with auricles at base, sometimes decurrent. Inflorescence lax panicle; flowers in dense clusters of 2–7; lower clusters distant. Lower bracts longer than floral clusters, upper shorter. Pedicels strong, thick, 4–10 mm long in lower flower, shorter in others. Calyx 4–7 mm long, parted into lanceolate lobes up to 3/4 of its length. Corolla 20–28 mm across, yellow, densely covered outside with rough stellate hairs. Filaments with short yellowish hairs (sometimes mixed with violet hairs); anthers all reniform, similar. Capsule ellipsoid or pyramidal-obovoid, densely pubescent or glabrescent, much longer than calyx, sometimes twice as long. June.

On mountain slopes.—*Soviet Central Asia*: Kyzyl Kum (on monadnocks), mountain regions of Turkmenia, Amu Darya, Syr Darya, Pamiro-Alai, Tien Shan. *General distribution*: Iran (Afghanistan). Described from the environs of Samarkand from collections of A. Lehman, dt. 4.9.1841. Type in Paris.

*Hybrid*: *V. bactrianum* × *songoricum* Murb. (Neue Nachträge Monogr. Verbasc. (1936) 34), described from collections in Guralash (western Pamiro-Alai mountains).

8. *V. songoricum* Schrenk ex Fisch. and Mey. Enum pl. nov. I (1841) 26; Ldb. Fl. Ross. III, 199; Grossh. Fl. Kavk. III, 365; Murb. Monogr. 244.—*V. polystachyum* Kar. and Kir. in Bull. Soc. Nat. Mosc. XIV (1841) 716.—*V. khorassanicum* Boiss. Fl. or. IV (1879) 319.—*V. daenense* Boiss. Diagn. Pl. or. I, 7 (1846) 38; Fl. or IV, 315.—*V. ibericum* Schmalh. in Ber. deutsch. bot. Gesellsch. X (1892) 290.

Biennial. Plant densely ash-gray tomentose, glabrescent later in upper part, eglandular. Stem 60–150 cm tall, erect, leafy, profusely branched above. Radical leaves subsessile, 15–40 cm long, lanceolate or oblong-lanceolate, acute or subacute obscurely crenate, base cuneate; cauline



leaves smaller, subsessile or short-petiolate; upper leaves cordate-ovate, mucronate and with short decurrent auricles at base. Inflorescence profusely branched, paniculate; flowers in clusters of (2)3-4(7), crowded. Bracts of lower flowers cordate-orbicular, mucronate; others broadly ovate, acuminate. Pedicel of middle flower in each cluster 5-12 mm long, with two bracteoles and those of lateral flowers in each cluster shorter, without bracteoles. Calyx parted into linear-lanceolate lobes up to  $\frac{3}{4}$  of its length or almost up to base. Corolla yellow, 25-32 mm across, without pellucid glands, densely pilose outside. Anthers all similar, reniform, medifixed. Style thickened above. Capsule broadly ellipsoid or obovoid, obtuse. May to June.

On stony slopes, in grass-forb-dominated mountain steppe, rarely in old pastures. *Caucasus*: southern and eastern Transcaucasia; *Soviet Central Asia*: Aral-Caspian Region (Mangyshlak, Karatau Range, up to Bischoku summit), Dzh.-Tarbagatai, mountain regions of Turkmenia, Pamiro-Alai, Tien Shan. *General distribution*: Armenia-Kurdistan, Iran. Described from a specimen collected by Schrenk, perhaps near foothills of Karatau on 11th June (1840). There is confusion here, since on this particular day Schrenk was at Dzhungarian Ala-Tau on the upper reaches of the Karatal river. At the same time, this plant was collected by Karelin 'from foothills of Tarbagatai Range, mainly along the Burgun River' (labeled *V. polystachyum* Kar. and Kir.). Karelin's specimens have on the label "Semipalatinsk." This is an obvious mistake, since no one has ever found this plant north of Tarbagatai. Type in Leningrad.

*Economic importance*: Due to a large corolla and the presence of active principles in it, this plant can be used as a medicinal plant, like *V. phlomoides* L.

9. *V. banaticum* Roch. ap. Schrad. Monogr. II (1823) 28.—*V. heldreichii* Boiss. Diagn. Pl. or. II, 3 (1856) 147; Fl. or. IV. 326.—*Ik.*: Roch. Pl. banat. tab. 18, f. 38; Rchb. Ic. Fl. germ. XX, tab. 37.—*Exs.*: Orphan. Fl. gr. exs. No. 733; Fl. austro-hung. exs. No. 2933.

Biennial. Stem 50-100 cm tall, cylindrical or indistinctly angular above, leafy, sparsely stellate-hairy, later subglabrous or glabrescent, generally dark red, branched near the tip; branches slender, angular, ascending or suberect. Radical leaves petiolate; petioles 4-10 mm long, densely gray-tomentose; lamina oblong or oblong-ovate, 10-25 cm long, 3-10 cm broad, obtuse, usually pinnatifid at base, with 1-3 small lobes on each side; leaves sometimes undivided, coarsely crenate, upper surface sparsely pubescent or, finally glabrescent, more densely pubescent beneath, at least along veins, upper surface of cauline leaves glabrous or subglabrous; lower cauline leaves oblong, subobtuse, coarsely doubly crenate, usually slightly incised at base, narrowed into a long petiole; middle cauline

leaves subsessile, ovate or oblong-ovate, subobtuse or short-pointed; upper cauline leaves sessile, not decurrent, cordate-ovate or cordate, mucronate, remotely dentate. Inflorescence paniculate; flowers in clusters of 3–8, sparsely disposed on inflorescence branches. Bracts in lower floral clusters cordate or cordate-ovate, as long as longer pedicels; bracts in upper clusters lanceolate-ovate, much shorter than longer pedicels. Pedicels densely tomentose-villous, glabrescent, strong, 4–10 mm long. Calyx 2.5–4 mm long, tomentose-villous at base, with linear-lanceolate or lanceolate lobes, glabrous at apex. Corolla yellow, 15–22 mm long, 135 stellate-pubescent outside. All filaments white-pilose; anthers all reniform, inner surface of connective with cluster of clavate papillae. Capsule broadly ellipsoid, 3–4.5 mm long, obtuse, apiculate, glabrescent. June.

In sandy soils.—*European USSR*: Black Sea Region (Berkutsk flood plain, Aleshki Sands). *General distribution*: Balkan States (Greece, Bulgaria, Romania, Yugoslavia). Described from Banat. Type in Weimer (Haussknecht Herbarium).

10. *V. speciosum* Schrad. Hort. Gotting. II (1811) 22; ej. Monogr. II. 12; Ldb. Fl. Ross. III, 199; Boiss. Fl. or. IV, 325; Schmalh. Fl. II, 259; Grossh. Fl. Kavk. III, 366; Murb. Monogr. 268.—*V. longifolium* Ldb. Fl. Ross. III (1849) 195 (cf. *ibid.*, p. 199 in synonyma and *V. speciosum*).— *Ic.*: Schrad. Hort. Gotting. II, tab. 16; Rchb. Ic. fl. germ. XX, tab. 25.— *Exs.*: Pl. exs. Boh.-Slov. No. 63; Fl. austro-hung. exs. No. 2134.

Biennial. Plant gray-tomentose. Stem 100–200 cm tall, strong, erect, angular-ribbed, densely leafy, branched above. Leaves all entire; radical leaves oblong-lanceolate, short-petiolate, 20–40 cm long, 3–6 cm broad, acute, gradually narrowed into petiole; lower cauline leaves similar to radical, but sessile, smaller, with more or less distinct auricles at base; upper leaves much smaller, cordate-ovate, acuminate; uppermost leaves cordate-orbicular, sharply narrowed into mucro, margin more or less crispate, with auricles at base, not adnate to stem. Inflorescence terminal, pyramidal panicle; flowers in dense multiflorous clusters. Lower bracts ovate-lanceolate, upper lanceolate, all shorter than flowers. Pedicel of primary flower at full length 5–12 mm long, with 2 bracteoles at base; rest shorter and generally without bracteoles. Calyx 3–5 mm long, with narrow lanceolate, acute lobes. Corolla yellow, 20–30 mm long, without pellucid glands, stellate-pubescent outside. Filaments densely covered with white hairs, not very long; anthers all reniform, with clavate thick papilliform hairs on the inner side of connective. Style glabrous below, thickened above; stigma obovoid. Capsule 4–6 mm long, oblong-obovoid, obtuse or truncate, stellate-pilose, without spinule at apex, longer than calyx. June to July.

*European USSR*: Bessarabia, Black Sea Region (near Rybnitsa); *Caucasus*: western, southern and eastern Transcaucasia. Talysh. *General distribution*: Central Europe, Balkan States-Asia Minor, Armenia—Kurdistan (Kars). Described from Central Europe. Type in Leningrad.

11. *V. megaphlomos* (Boiss. and Heldr.) Hal. in Verh. Zool.-Bot. Ges. Wien, XLVII (1898) 137; Murb. Monogr. 272.—*V. speciosum* var. *megaphlomos* Boiss. and Heldr. in Boiss. Diagn. Pl. or. II, 3 (1856) 144; Fl. or. IV, 325.—*Exs.*: Orphan. Fl. gr. No. 376; Heldr. Herb. gr. norm. No. 98.

Biennial. Plant densely yellowish tomentose all over. Stem 70–250 cm tall, large, obtuse-angular, leafy, branched above. Leaves entire; radical leaves numerous, petiolate; petiole 2.5 cm long; lamina oblong-ovate, tapering at both ends, 8–20 cm long, 3–5 cm broad; cauline leaves sessile, middle and upper leaves with auricles at base, upper sometimes slightly decurrent. Inflorescence profusely branched panicle with compact crown; flowers in clusters, lower clusters more or less distant, with more flowers than upper ones, generally more crowded. Bracts broadly ovate, upper bracts ovate-lanceolate. Pedicel of primary flower 5–10 mm long at full length, with 2 bracteoles at base; pedicels of other flowers shorter. Calyx 3–5.5 mm long, with narrow lanceolate, acute lobes. Corolla yellow, 18–25 mm across, without pellucid glands, stellate-pubescent outside. Filaments all densely white-pilose throughout; anthers all similar, reniform. Style pubescent below. Capsule 5–6.5 mm long, oblong-ovoid, obtuse, apiculate, longer than calyx, densely pubescent, later more or less glabrescent.

*Caucasus*: Talysh. *General distribution*: Balkan States-Asia Minor (Greece). Described from Greece from Malevo Mt. (Orfanides). Type in Geneva.

*Note*. Specimens of this plant from Talysh were identified (in the herbarium of the Botanical Institute of Akad. Nauk. SSSR) by E.V. Wulf as variety *V. speciosum* var. *megaphlomos* Boiss. and Heldr. Murbeck and Halachi recognize this form as separate species and enumerate in detail its distinctive features which are difficult to detect in herbarium specimens. Since the present *V. megaphlomos* (Boiss. and Heldr.) Hal. is found only in Greece, the precise identification of the Talysh plant remains unconfirmed.

12. *V. cheiranthifolium* Boiss. Diagn. Pl. or. I, 4 (1844) 56; Fl. or. IV, 325; Murb. Monogr. 275.

Biennial, rarely perennial. Plant densely ash-white or yellowish tomentose throughout, sometimes glabrescent above, eglandular. Stem 40–120 cm tall, usually cylindrical, leafy, generally branched above. Radical leaves generally long-petiolate or subsessile, with narrow lanceolate 25–30 cm long, 3–6 cm broad lamina; upper leaves sessile,



ovate or orbicular-cordate. Inflorescence lax panicle; flowers in clusters of 3–5(7), crowded or somewhat spaced even at early flowering stage. Bracts broadly triangular in lower flowers, narrow, linear-lanceolate in upper flowers, all acuminate, usually shorter than flowers. Pedicel of middle flower in cluster, up to 12 mm long at full length, with two bracteoles; lateral flowers with shorter pedicels and generally ebracteolate. Calyx 2–3 mm long, parted into linear or triangular-lanceolate lobes (var. *transcaspicum* Murb.) almost up to base, acute or acuminate. Corolla yellow, 15–26 mm across, without pellucid glands, densely stellate-pubescent outside. Filaments all densely white-tomentose; anthers all similar, reniform, not decurrent. Capsule oblong-cylindrical or cylindrical, obtuse, 2–3 times as long as calyx. June to July.

On mountain slopes.—*Caucasus*: southern Transcaucasia (Vagarshapat); *Soviet Central Asia*: Mountainous Turkmenia. *General distribution*: Asia Minor, Armenia-Kurdistan, Iran. Described from pastures in the high-mountain region of eastern Kadmus. Type in Geneva.

Hybrid: *V. cheiranthifolium* × *songoricum*.

*Note*. The plant from Kopet-Dag, recognized by Murbeck (l.c. 276) as a separate variety—var. *transcaspicum* Murb., is distinguished by its petiolate radical leaves and triangular-lanceolate calyx teeth.

13. *V. pinnatifidum* Vahl, Symb. bot. II (1791) 39; Ldb. Fl. Ross. III, 198; Boiss. Fl. or. IV, 312; Schmalh. Fl. II, 258; Grossh. Fl. Kavk. III, 365; Murb. Monogr. 283.—*lc.*: Sibth. and Sm. Fl. gr. III, tab. 288; Bot. Mag. tab. 1777.—*Exs.*: Orphan. Fl. gr. exs. No. 359.

Annual. Root strong, elongated, vertical. Stem 30–50 cm tall, strong, branched almost from base, sparsely covered with long branched grayish hairs when young, later somewhat glabrescent, cylindrical in the lower part, angular above. Radical leaves long-petiolate; petioles 2–5(9) cm long, lamina 8–25 cm long, upper surface very minutely glandular, sparsely pubescent, later glabrescent, lower surface and petiole generally gray-tomentose, rarely subglabrous, oblong or oblong-lanceolate, pinnatifid or deeply pinnatipartite, with oblong, subobtusate lobes, the lower ones irregularly pinnately lobed or incised-dentate; cauline leaves less deeply incised, with shorter petioles; middle cauline leaves sessile, narrowly oblong, pinnatipartite or coarsely incised-dentate; upper leaves with cordate-amplexicaul base, oblong- or triangular-lanceolate, dentate. Flowers in clusters of 2–4, spaced on floral branches even at early flowering stage. Bracts more or less tomentose, subcordate or ovate-triangular, equaling or exceeding the length of floral cluster, serrate-dentate at base or above; flowers sessile, the primary flower in cluster with 2 rather large bracteoles, generally dentate at base. Calyx 5–7 mm long, finely white-pilose, with linear-lanceolate, acute lobes. Corolla



- 138 yellow, 24–28 mm across, densely covered with pellucid glands, pubescent outside; the major part of 2 anterior and 3 posterior filaments densely covered with yellow papilliform hairs. Style pubescent at base; stigma subglobose. Capsule ellipsoid-obovoid, 4–5 mm long, subobtusate, later somewhat glabrescent. June.

On sandy seashores.—*European USSR*: Crimea (southern shore, from Sudak to Feodosia, also near Lake Chokrak); *Caucasus*: western Transcaucasia (Taman Peninsula to Akhtanizovsk, the seashore near Kodor.). *General distribution*: Balkan States (Greece, European Turkey). Described from islands of the Aegean Sea. Type in Copenhagen.

*Note*. An old report from the lower reaches of the Dnieper by Ledebour (l.c.) has not been confirmed by the latest studies and is therefore to be treated as doubtful.

14. *V. artvinense* Wulff in Izv. Kavk. muzeya, XI (1917) 4; Grossh. Fl. Kavk. III, 366; Murb. Monogr. 310.—*l.c.*: Wulff, l.c., Plate VII.

Biennial or perennial. Plant ash-gray-pubescent throughout. Stems about 30 cm tall, erect, numerous, perhaps due to decay of the main stem and development of secondary stems, sparsely leafy, branched above. Radical leaves petiolate; petiole narrow, about 3 cm long; lamina broadly ovate, 7–10 cm long, 5–6 cm broad, subobtusate, crenate-dentate, broadly rounded at base; cauline leaves much smaller, dentate; lower cauline leaves short-petiolate, ovate, subacute, upper cauline leaves sessile, ovate-cordate, short-acuminate. Inflorescence poorly branched, paniculate, with slender branches; flowers in clusters of 2–4, clusters spaced even during early anthesis. Lower bracts oblong-lanceolate, subacute, as long as floral cluster, others linear-oblong, shorter than cluster. Pedicel of primary flower in cluster with 2 bracteoles at base, 3 mm long at early flowering stage, later 4 mm long; pedicels of other flowers shorter; all pedicels somewhat thickened in fruit. Calyx 3–4 mm long, with cluster of tomentose hairs at base, divided into linear or linear-lanceolate lobes almost up to base, later glabrescent. Corolla yellow, about 20 mm across, with numerous pellucid glands, pubescent outside. Two anterior filaments in lower part and the other three filaments covered throughout with whitish clavate papilliform hairs thickened above; anthers all reniform. Style pubescent at base. Capsule cylindrical 6–7 mm long, pubescent, apiculate, twice (or more) as long as calyx. May to June.

*Caucasus*: Western Transcaucasia (near Artvin Province). Endemic? Described from Lomashen. Type in Leningrad.

- 139 15. *V. stachydiforme* Boiss. and Buhse in Nouv. Mém. Soc. Nat. Mosc. XII (1860) 159; Boiss. Fl. or. IV, 319; Grossh. Fl. Kavk. III, 366; Murb. Monogr. 314.—*V. talyshense* Boiss. and Buhse, l.c. 160.

Perennial. Plant densely grayish yellow-tomentose throughout. Stem 25–50 cm tall, single or many from same rootstock, cylindrical, leafy, simple or sparsely branched above. Radical leaves petiolate; petiole 2–4 cm long; lamina oblong, 3–5 cm long, 2–2.5 cm broad; cauline leaves densely tomentose mainly beneath; lower leaves with short, 0.5–1.5 cm long petiole, oblong or oblong-lanceolate lamina, crenate, 3–6 cm long, 2.5–3 cm broad; middle leaves subsessile, lanceolate, acute; upper leaves sessile, triangular-lanceolate, with truncate or subcordate base, long acuminate, crenate-dentate toward base. Flowers in clusters of 2–4; clusters closely disposed at early flowering. Lower bracts lanceolate, caudate, slightly longer than flower; upper bracts setaceous, shorter than flowers, all tomentose-villous beneath. Pedicels of primary flowers 2–4 mm long, with 2 setaceous bracteoles; other flowers sessile or with very short pedicel. Calyx 4.5–5.5 mm long, divided into linear-subulate or linear-lanceolate lobes up to base. Corolla yellow, 12–18 mm across, densely covered with pellucid glands, soft-tomentose outside; corolla tube somewhat broadened above. Anterior filaments glabrous above, densely covered with yellow papilliform hairs in the lower part, like other filaments. Ovary ovoid, densely pubescent; style villous tomentose at base. Capsule 4.5–6.5 mm long, oblong-cylindrical, subobtuse, apiculate, villous-tomentose, later glabrescent, longer than calyx.

In wastelands.—*Caucasus*: Talysh. Endemic. Described from Talysh. Type in Leningrad.

*Note.* Boissier and Buhse have described *V. stachydiforme* as well as *V. talyschense* as new species in the aforementioned paper. The latter species was described from incomplete specimens collected from the mountainous region of Talysh. Murbeck neither saw specimens of *V. talyschense* collected by Buhse nor the description of this species, having no access to the Memoirs of the Moscow Society of Naturalists, and, therefore, placed *V. talyschense* among the unconfirmed species. There is no reference to this species in Grossheim's *Flora* or in Wulff's article on Crimean-Caucasian *Verbascum*. A study of the authentic specimens of Boissier and Buhse in the herbarium of the Botanical Institute, Akad. Nauk SSSR, has revealed that *V. talyschense* and *V. stachydiforme* are conspecific.

140 It is interesting to note that *V. macrophyllum* Boissier and Buhse, described from northern Iran in a joint article and placed by Murbeck among unconfirmed species, has actually not been collected by anyone else after Buhse.

16. *V. turkestanicum* Franch. in Ann. Sc. Nat. Bot. sér. VII, XVIII (1883) 221; O. and B. Fedtsch. Perech. rast. Turkest. 5; Murb. Monogr. 315.

Biennial. Plant densely white-tomentose throughout, pubescence shedding later in flakes. Stem 60–120 cm tall, erect, simple, leafy; leaves tomentose, also glandular-hairy above; radical leaves long-petiolate, lamina 8–16 cm long, ovate or ovate-oblong, short-acuminate, with somewhat decurrent, broadly cuneate auricles at the base; upper leaves decurrent or with cordate base, amplexicaul. Inflorescence long cylindrical spicate raceme; flowers few in each cluster. Bracts of middle flowers scarcely exceeding flowers, bracts of lateral flowers shorter; all bracts tomentose, with very minute glands. Pedicel of middle flower 2–4 mm long in early flowering, with 2 bracteoles. Calyx 5–8 mm long, divided into linear lobes almost to base. Corolla yellow, about 15 mm across, tomentose outside; inner side of upper corolla lobes slightly villous at base. Two anterior stamens longer with upper half of filaments white-tomentose; anthers all similar, reniform. Style thickened above. Capsule broadly ellipsoid or obovoid, obtuse, densely stellate-pubescent. June to July.

On stony mountain slopes.—*Soviet Central Asia*: Pamiro-Alai, Tien Shan (west). Endemic. Described from upper reaches of Zeravshan, between villages Novobat and Sangi-Mailek. Type in Paris.

17. *V. gnaphalodes* M.B. Fl. taur.-cauc. III (1819) 152; Ldb. Fl. Ross. III, 198; Boiss. Fl. or. IV. 316; Schmalh. Fl. II, 258; Grossh. Fl. Kavk. III, 365; Murb. Monogr. 317, No. 117.—*Exs.*: Herb. Fl. Cauc. No. 445.

Biennial. Young plant densely appressed white-floccose, later glabrescent. Stem 70–100(120) cm tall, relatively thick, erect, cylindrical, simple, sometimes with 1–2 branches in inflorescence; later often subglabrous. Leaves all tomentose beneath, snow-white, or later grayish, upper surface finally glabrescent, grayish or greenish, sometimes with pink veins; radical leaves petiolate, petioles 5–10 cm long, lamina oblong-obovate, 15–50 cm long, 5–15 cm broad, crenate, cuneate at base; middle cauline  
 141 leaves petiolate or subsessile, oblong-ovate or ovate, acuminate; upper leaves sessile, broad-ovate or suborbicular, gradually tapering or sharply pointed. Inflorescence terminal raceme, later highly elongated, sometimes laterally sparsely branched; clusters 5–9 flowered, lower clusters usually spaced; inflorescence axis somewhat thickened throughout. Lower bracts similar to upper cauline leaves, usually longer than floral clusters, others ovate-lanceolate, almost erect in fruit, finally distinctly thickened, lower bracts 5–8 mm long, slightly exceeding calyx length. Calyx 4–7 mm long, densely villous-tomentose, divided into oblong-lanceolate lobes almost to base. Corolla yellow, 16–28 mm across without pellucid glands, soft-pilose outside, with 5 brownish spots in the throat. Anterior filaments in lower part and posterior covered with long whitish papilliform hairs. Style pubescent in lower part. Capsule oblong-ellipsoid or obovoid, 5–6(7) mm long, exceeding calyx, obtuse, apiculate, later glabrescent. June to July.



Mainly on shores of the Black Sea, on sandy and pebbly beaches and along flowing mountain rivers and rivulets, away from the seashore.—*European USSR*: Crimea (southern shore); *Caucasus*: Ciscaucasia (There is a single specimen in the herbarium of the Botanical Institute, Akad. Nauk. SSSR, collected in Goryachii Klyuch, but since it has only leaves and no flowers or fruits, its identification is extremely difficult to confirm.), western Transcaucasia (from Novorossiisk to Batumi, frequent), eastern Transcaucasia (Tbilisi?), southern Transcaucasia (Bakuriani). *General distribution*: eastern Anatolia (Lazistan), Armenia-Kurdistan (Kars). Described from Yalta. Type in Leningrad.

Hybrid: *V. gnaphalodes* × *phlomoides*. Murbeck observed this hybrid in the Botanical Garden of Lund and saw a similar plant in the herbarium with the label 'Crimea.' Herbarium specimens collected by J.N. Woronow near Batumi and identified by him as *V. thapsus* × *gnaphalodes* apparently belong here.

Wulf referred these specimens to the hybrid *V. phlomoides* × *speciosum*, but I think it is more correct to refer them to *V. gnaphalodes* × *phlomoides*.

*Note.* *V. gnaphalodes* M.B. shows a gradual transition to *V. eriorhabdon* Boiss. (including *V. balansae* Bornm.). One of these transitional specimens was collected by O.A. and B.A. Fedtschenko near Batumi and named *V. gnaphalodes* M.B. var. *laxum*.

18. *V. eriorhabdon* Boiss. in Tchihatsch. *Asie Min. Bot.* II (1860) 4; Boiss. *Fl. or.* IV, 317, pro min. parte; Murb. *Monogr.* 319.—*V. balansae* Bornm. in Fedde, *Repert.* XXVII (1930) 361/73.

Biennial. Plant densely white floccose throughout. Stem 60–150 cm tall, erect, cylindrical, leafy, early glabrescent, sometimes simple, but usually branched near tip. Radical leaves petiolate; petioles slender, 2–3 cm long, or thicker and 5–8 cm long; lamina oblong-ovate, subobtusate, 6–8 cm long; 3–4 cm broad, or somewhat narrowly lanceolate, acute, 25–40 cm long, 5.5–7.5 cm broad, crenate mainly toward apex, glabrescent above, persistently tomentose beneath; lower leaves short-petiolate or subsessile, oblong-ovate, crenat-dentate; upper leaves sessile. Flowers in clusters of 4–7, clusters crowded during early flowering. Bracts linear-subulate, scarcely longer than flowers, tomentose and sometimes minutely glandular. Pedicels somewhat thickened later, 3–5.5 mm long. Calyx 3–5 mm long at first, later 5–6 mm long, divided up to base into linear lobes, minutely glandular and tomentose. Corolla erect, 18–26 mm across, without pellucid glands outside, floccose-tomentose at least in lower part. All filaments, except upper part of middle stamens, densely covered with whitish papilliform hairs. June to July.



*Caucasus*: western Transcaucasia (near Tuapse). *General distribution*: Asia Minor (Lazistan). Described from Paphlagonia from Chikhachev's collections. Type in Geneva.

*Note*. An extremely doubtful species, reported by Murbeck from our region from specimens collected by Palibin and Vorobev in 1911 (No. 274). Murbeck who identifies these specimens as var. *balansae* (Bornm.) Murb. regards their identification as questionable.

19. *V. lychnitis* L. Sp. pl. (1753) 177; Ldb. Fl. Ross. III, 200; Boiss. Fl. or. IV, 324; Schmalh. Fl. II, 259; Grossh. Fl. Kavk. III, 366; Murb. Monogr. 344; Kryl. Fl. Zap. Sib. IX, 2412.—*V. pulverulentum* M.B. Fl. taur.-cauc. I (1808) 160, non Vill.—*V. biebersteinii* Bess. Enum. pl. Volh. (1822) 53.—*lc.*: Fl. Dan. IV, tabl. 586; Rchb. Ic. fl. germ. XX, tabl. 29.—*Exs.*: Rchb. Fl. Germ. No. 636; Billot, Fl. gall. and germ. exs. No. 2893; Fl. pol. exs. No. 854; Tarachkov and Poganka, Rast. Orlovskoi gub.; Fl. austro-hung. No. 3281, 3289.

Biennial. Plant densely covered throughout with minute, appressed, stellate, grayish green hairs. Stem 50–160 cm tall, erect, ribbed-striated, leafy, branched from middle or above; branches numerous, suberect. Leaves with sparse fine stellate hairs above, grayish tomentose beneath; radical and first cauline leaves generally short petiolate, petioles 2–4(6) cm long, lamina 15–30 cm long, 10–12(15) cm broad, obovate or oblong-lanceolate, subobtuse, rarely acuminate, with cuneate base, crenate; middle cauline leaves sessile or subsessile, oblong or ovate-lanceolate, acute, crenate-dentate; upper cauline leaves sessile, not decurrent, with rounded base, ovate or lanceolate. Inflorescence profusely branched pyramidal panicle; branches sometimes very slender (var. *kanitzianum* Simk. and Walz.). Flowers in clusters of 2–7, crowded. Lower bracts lanceolate, upper lanceolate or subulate-linear. Pedicels of primary flower in cluster with 2 bracteoles, reaching a length of 5–10 mm after flowering; other pedicels shorter, not thickened in fruit. Calyx 2.5–4 mm long, floccose, glabrescent later, divided almost to base into linear or oblong-lanceolate lobes. Corolla yellow, rarely whitish, 12–20 mm across, with pellucid glands, stellate-hairy outside. Anterior filaments glabrous above, their bases and other filaments, densely white-papillose hairy. Style pubescent at the base; stigma depressed hemispherical. Capsule ellipsoid, obovoid, obtuse, pubescent, later glabrescent, 4–5 mm long, 2.5–4 mm broad,  $1\frac{1}{2}$  times or more as long as calyx. July to August.

In steppes, on steppe slopes, arrested sands, along forest edges, forest glades.—*European USSR*: Ladoga-Ilmen (introduced in Komarovo near Leningrad), Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Trans-Volga Region, Bessarabia, Black Sea Region, Crimea, Lower Don, Lower Volga (near Stepново, also near the town of Uralsk); *Caucasus*:

western Transcaucasia (near Dzhubeg); *Western Siberia*: Upper Tobol (Ilekssk Region). *General distribution*: Central and Atlantic Europe, Balkan States-Asia Minor. Described from Central Europe. Type in London.

Hybrids: *V. lychnitis* × *nigrum*, *V. lychnitis* × *pyramidatum*, *V. lychnitis* × *phlomoides*, *V. lychnitis* × *thapsus*, *V. lychnitis* × *phoeniceum* (= *V. claudiopolitanum* Simk.).

20. *V. turcomanicum* Murb. Monogr. (1933) 359.—*lc.*: Murb. l.c. tab. XVII.

Biennial. Plant sparsely pubescent, eglandular. Stem 40–60 cm tall, branched almost from base, moderately leafy, cylindrical, with scattered branched hairs below, totally glabrous above. Leaves green, glabrous, or hairy along veins, diffusely pubescent above, grayish green beneath; radical leaves few, not rosulate, on long narrow petioles, lamina 15–18 cm long, oblong, obtuse, obtuse-crenate, cuneate at base; middle cauline leaves  
144 subsessile, with rounded or subcordate base, acuminate. Inflorescence profusely branched, paniculate; flowers in lax clusters of (2)4–7. Bracts ovate-lanceolate, shorter than pedicels. Pedicels of central flower 4–7 mm long, with 2 bracteoles. Calyx 3.5–4.5 mm long, divided up to base into linear or oblong lobes. Corolla yellow, 12–18 mm across, pubescent outside. Filaments whitish tomentose; anthers all similar, reniform; connective not papillose. Ovary broadly ellipsoid, densely pubescent. June to July.

On stony mountain slopes and in the central mountain zone. *Soviet Central Asia*: mountain regions of Turkmenia (western edge of Kopet-Dag Range). Endemic. Described from the plateau near Aidere ravine. Type in Leningrad.

21. *V. sinuatum* L. Sp. pl. (1753) 178; Ldb. Fl. Ross. III, 198; Boiss. Fl. or. IV, 522; Schmalh. Fl. II, 258; Grossh. Fl. Kavk. III, 563; Murb. Monogr. 367.—*V. undulatum* M.B. Fl. taur.-cauc. I (1808) 161.—*lc.*: Sibth. and Sm. Fl. gr. tab. 227; Rchb. Ic. fl. germ. XX, tab. 24.—*Exs.*: Billot, Fl. gall. and germ. exs. No. 1717; Dörfner, Herb. norm. No. 4366.

Biennial. Stem 50–100 cm tall, leafy, branched almost from base; branches slender, recurved or ascending. Radical leaves sessile or subsessile, rarely short-petiolate, lamina 20–35 cm long, spatulate-oblong or oblong-lanceolate, obtuse, lobed, often pinnatifid toward base, sparsely pubescent above, gray and sparsely pubescent beneath; cauline leaves sometimes shortly winged, decurrent, lobed or incised at base, upper leaves subentire. Inflorescence branched, paniculate; flowers in clusters of 2–7, upper flowers sometimes borne singly, all regularly spaced from early flowering. Bracts broad, cordate-triangular, short-acuminate, with glandular hairs, sometimes tomentose. Pedicel of central flower 2–5 mm long, with 2 bracteoles. Calyx with glandular hairs, somewhat accrescent,

divided almost to the base into ovate-lanceolate lobes. Corolla yellow, 15–30 cm (mm) across, generally densely pellucid-glandular, stellate hairy outside. Filaments with violet papilliform hairs; anthers all similar, reniform. Style slightly thickened above. Capsule broadly ellipsoid or subglobose, stellate-hairy, equaling calyx, or slightly longer. July to August.

In fields, on loessal and clayey hills, in rubbly places and, sometimes, in saline habitats.—*European USSR*: Black Sea Region (Khereson, Melitopol), Crimea (southern shore); *Caucasus*: western and eastern Transcaucasia, Talysh; *Soviet Central Asia*: mountainous Turkmenia (only the var. *adenosepalum* Murb.). *General distribution*: Mediterranean  
145 Region, Balkan States-Asia Minor, Armenia-Kurdistan, Iran. Described from Montpellier and Florence. Type in London.

Hybrid: *V. sinuatum* × *songoricum*.

22. *V. gossypinum* M.B. Fl. taur.-cauc. III (1819) 152; Ldb. Fl. Ross. III, 198; Boiss. Fl. or. IV, 348; Murb. Monogr. 375.—*V. hohenackeri* Fisch. and Mey. Ind. V. sem. hort. Petrop. (1838) 42; Ldb. l.c. 197; Boiss l.c. 313; Grossh. Fl. Kavk. III, 363.

Biennial. Plant densely dull white-floccose throughout, pubescence gradually shedding in flakes, also glandular-pubescent. Stem 40–160 cm tall, erect, leafy, usually simple, rarely sparsely branched above, branches short. All leaves densely white-tomentose on both surfaces, or lower leaves greenish above; cauline leaves with minute glands, mainly on upper surface; radical leaves short-petiolate, petioles 1–2(4) cm long, lamina 6–12 cm long, 2–4 cm broad, obovate or oblong-lanceolate, obtuse or short-acuminate, margin crenate; middle and upper cauline leaves sessile, somewhat decurrent. Inflorescence simple raceme, sometimes branched at base; flowers 2–7 in distant clusters. Lower bracts lanceolate, long acuminate. Pedicels of primary flowers reaching 6 mm in length, with 2 relatively long bracteoles at base. Calyx reaching 8 mm, glabrescent, divided almost to base into linear lobes. Corolla yellow, 15–25 mm across, without pellucid glands, stellate-hairy outside. Two anterior filaments longer, glabrous near apex, the remaining part, along with other filaments, with dense purple-violet (or whitish?) hairs. Capsule oblong or pyramidal-cylindrical, glabrescent, 1.5–2 times as long as calyx. June to July.

On mounds, rocks and along mountain forest edges.—*Caucasus*: all regions. *General distribution*: Iran (mountainous regions, neighboring Talysh). Described from Transcaucasia ('Iberia') from Wilhelms' collections. Type in Leningrad.

23. *V. hajastanicum* Bordz. in Monit. Jard. Bot. Tiflis, nov. ser. V (1931) 45; Grossh. Fl. Kavk. III, 365; Murb. Monogr. 381.



Biennial. Plant grayish yellow-pubescent throughout with stellate or branched hairs, also glandular hairy above. Stem 70–100 cm tall, erect, cylindrical, leafy, simple. Leaves greenish above when mature, glabrescent, densely tomentose beneath; radical leaves petiolate, petioles 4–10 cm long, lamina oblong-lanceolate or oblong, usually subacute, 10–20 cm long, 3–5 cm broad, remotely crenate; upper cauline leaves sessile, lanceolate, truncate at base. Inflorescence dense, virgate, spicate raceme; flowers in clusters of 2–7; clusters crowded, finally somewhat lax. Lower bracts broadly lanceolate, long acuminate, as long as floral clusters. Pedicels of primary flowers with 2 linear bracteoles at base, up to 4–8 mm long in fruit. Calyx, at first, 5–6.5 mm, finally up to 8 mm long, densely glandular-hairy, divided almost up to base into ovate-lanceolate or lanceolate acute lobes. Corolla yellow, 24–36 mm across, without pellucid glands, with violet spots or stripes in throat, coarsely hairy outside. Stamens 5; anterior filaments glabrous at apex, remaining part, along with other filaments, with dense violet papilliform hairs; anthers all similar, reniform. Style pubescent at base. Capsule globose-ovoid, 4–5 mm long, densely stellate-hairy with short beak, shorter than calyx. July to August.

In stony places.—*Caucasus*: southern Transcaucasia (near Leninakan, on Mount Aragats and near Lake Sevan (Gökcha)). Endemic. Described from the places indicated. Type in Kiev and Leningrad.

Hybrids: *V. hajastanicum* × *phoeniceum* (= *V. roopianeum* Bordz.), *V. hajastanicum* × *georgicum* (= *V. hajastanicum* × *sceptrum*).

24. *V. varians* Freyn and Sint. in Bull. Herb. Boiss. IV (1896) 44.

Biennial. Plant densely or sparsely grayish white-tomentose throughout, soon glabrescent. Stem 30–80 cm tall, cylindrical, leafy, simple, or often branched above. Radical leaves petiolate, petioles 2.5–9 cm long, 3–8.5 cm broad, cuneate or rounded at base; upper cauline leaves broadly cordate or suborbicular, gradually tapering, coarsely crenate-dentate. Inflorescence paniculate; flowers usually in clusters of 4, rarely 5–7 or only 1 or 2 toward the tip; floral clusters distant after blooming. Bracts scarcely exceeding clusters in length, sometimes glandular, hairy; lower bracts ovate or lanceolate, others linear; pedicel of primary flower in cluster 3–6 mm long, not longer than calyx, usually with 2 bracteoles; pedicel somewhat thickened in fruit. Calyx 3.5–6.5 mm long, divided up to base into linear acute lobes. Corolla yellow 20–35 mm across without pellucid glands, sparsely tomentose outside with brown spots in throat. Anterior filaments glabrous above, the remaining part, along with other filaments, with dense purple-violet papilliform hairs; anthers all similar, reniform. Style sparsely pubescent at base. Capsule 5.5–7.5 mm long, oblong, obtuse, with short beak, slightly exceeding calyx. June to July.



On stony slopes.—*Caucasus*: southern Transcaucasia (near Lake Sevan). *General distribution*: Asia Minor, Armenia-Kurdistan. Described from Gümüşhane, Darasodag Mountains. Type in Brno.

25. *V. flexuosum* Wulff in Izv. Kavk. muzeya, XI (1917) 2.—*V. varians* Freyn and Sint. *β. flexuosum* Murb. Monogr. (1933) 387.—*lc.* Wulff, l.c. plate IV.

Biennial. Very similar to preceding species of which Murbek designated it a variety. Its main distinctive features are type of inflorescence long, raceme, usually unbranched or with a few branches at base; upper leaves, along with bracts and calyx, densely glandular and pedicel of primary flower finally exceeding calyx. Calyx lobes narrow-linear; capsule oblong-cylindrical.

*Caucasus*: southern Transcaucasia. Endemic. Described from former Kagyzman District near Zheleznye Vorota. Type in Leningrad.

26. *V. orientale* M.B. Fl. taur.-cauc. I (1808) 160; Schmalh. Fl. II, 200; Grossh. Fl. Kavk. III, 364.—*V. chaixii* Ldb. Fl. Ross. III (1849) 202.—*V. chaixii* var. *orientale* Murb. Monogr. (1933) 413.—*Exs.*: Callier, Iter. taur. 776.

Perennial. Plant generally densely canescent throughout. Stem 50–100 cm tall, erect, sparsely leafy, ribbed-striated, branched near apex. Leaves greenish above with scattered hairs or glabrous, generally somewhat densely pubescent beneath; radical leaves on 5–25 cm long petioles, lamina 10–30 cm long, 4–12 cm broad, oblong-ovate, subobtusely or subacute, with crenate margin; lower cauline leaves gray-tomentose beneath, tapering toward base, ovate, or crisped, sometimes slightly incised-lobed; upper cauline leaves ovate or ovate-lanceolate, rounded-ovate at base, and closely crenate-dentate. Inflorescence paniculate; flowers in clusters of 2–5, rowed or lower flower slightly apart. Bracts lanceolate or linear-subulate, shorter than flowers. Pedicels slender, in primary (lower) flower in cluster with 2 linear bracteoles at base. Calyx 3–5 mm long, densely gray-tomentose, divided almost up to base, lobes acute, lanceolate, rarely linear. Corolla yellow, with brown spots in throat, 148 20–25(30) mm across, densely pubescent outside. Filaments of anterior as well as posterior stamens uniformly covered with violet papilliform hairs; anthers reniform. Style glabrous or sparsely pubescent at base; stigma hemispherical. Capsule 3–5.5 mm long, broadly or oblong-ellipsoid, without beak, densely stellate-pubescent, slightly longer than calyx. June to September.

In steppes, mainly on slopes.—*European USSR*: Upper Volga, Middle Dnieper, Volga-Don, Trans-Volga Region; Bessarabia, Black Sea Region, Crimea, Lower Don (?), Lower Volga (?); *Caucasus*: Ciscaucasia; *Western*

*Siberia*: Upper Tobol (Chkalovsk Region—frequent); *Soviet Central Asia*: Aral-Caspian Region, Baltic States (foothills of Dzhungarian Ala-Tau), Dzh.-Tarbagatai, Tien Shan (Lake Issyk Kul Basin). *General distribution*: Balkan States (Bulgaria, Romania), Dzh.-Kashgar (Kuldzha). Described from 'Southern Russia and Ukraine.' Type in Leningrad.

Hybrids: *V. orientale* × *phoeniceum* (probably *V. laxum* × *phoeniceum*) (= *V. caucasicum* Fisch.), *V. orientale* × *wilhelmsianum* (obviously, it is *V. laxum* × *wilhelmsianum*, since *V. orientale* and *V. wilhelmsianum* do not grow together under natural conditions).

27. *V. laxum* Filar. and Jav. in Dechy, Kauk. III (1907) 99.—*V. orientale* β. *polyphyllum* C.A.M. in Ind. sem. hort. Petrop. (1845) Suppl. 75.—*V. chaixii* var. *polyphyllum* Murb. Monogr. (1933) 419.—*V. orientale* var. *parviflorum* Wulff ex Grossh. Fl. Kavk. III (1932) 364.—*V. sp. nov.* Hohenacker in herb. (planta ex Helenendorff, sine numero).—*Exs.*: Kolenati No. 26.

Perennial. Plant somewhat densely canescent throughout. Stem 50–80 cm tall, erect, densely leafy, ribbed-striated, branched above. Upper leaf surface greenish, lower sparsely pubescent or subglabrous along margins; radical leaves dying off early, petioles 2–10 cm long, lamina 10–20 cm long, 4–8 cm broad, oblong-ovate; cauline leaves numerous; lower cauline leaves petiolate, petioles 1.5 cm long, lamina oblong-ovate, cuneate or rounded toward base, more densely pubescent beneath; upper cauline leaves oblong-ovate or broadly lanceolate, sessile, closely crenate-dentate. Inflorescence paniculate, branches suberect; flowers in clusters of 2–5, crowded or somewhat distant. Bracts linear-subulate, shorter than flowers. Pedicels slender with 2 small bracteoles at base in primary (lower) flower. Calyx 2–3 mm long, densely gray-tomentose, divided almost up to base, lobes acute, linear. Corolla yellow, with brown patch in throat, 10–15(20) mm across, densely pubescent outside. Anterior filaments glabrous above, remaining part, along with posterior filaments, 149 uniformly covered with violet papilliform hairs; anthers all similar. Style glabrous or sparsely pubescent at base; stigma hemispherical. Capsule oblong-ellipsoid, 3–5.5 mm long, without beak, densely stellate-hairy, slightly longer than calyx. June to July.

On mountain slopes and along mountain forest edges.—*Caucasus*: Ciscaucasia, Dagestan, western, southern and eastern Transcaucasia. *General distribution*: eastern Anatolia (near Olty District). Described from ur. Ezeneam. Type in Budapest.

Hybrids: *V. laxum* × *phoeniceum* (= *V. chaixii* var. *polyphyllum* × *phoeniceum* = *V. achalkalakense* Bordz); *V. laxum* × *pyramidatum* (= *V. chaixii* var. *polyphyllum* × *pyramidatum*), *V. laxum* × *wilhelmsianum* n. hybr.—is distinguished from *V. laxum* by larger flowers and

from *V. wilhelmsianum* by numerous cauline leaves, the absence of radical leaves, obviously due to early dying, and by narrower calyx lobes. I refer here the plants collected by Overin on July 26, 1861, in the eastern Caucasus from Gumbet, —Daniah's relict.

*Note.* As indicated by N.A. Trointsii, the hybrid *V. laxum* × *phoeniceum* (or *V. orientale* × *phoeniceum*, as he calls it) is the most characteristic of hybrids after *V. ovalifolium* × *phoeniceum*, found in Transcaucasia; this plant fully merits being introduced into cultivation as an ornamental plant.

28\* *V. nigrum* L. Sp. pl. (1753) 178; Ldb. Fl. Ross. III, 201; Boiss. Fl. or. IV, 328; Schmalh. Fl. II, 259; Grossh. Fl. Kavk. III, 364; Murb. Monogr. 423; Kryl. Fl. Zap. Sib. 2412.—*V. alopecurus* Thuill. Fl. exs. Paris, ed. 2 (1809) 110.— *Ic.*: Fl. Dan. VII, tab. 1088; Rchb. Ic. fl. germ. XX, tab. 28, f. I.— *Exs.*: Fl. austro-hung, exs. No. 1743; Rchb. Fl. germ. exs. No. 637; Pl. Finl. exs. No. 907.

Perennial, rarely biennial. Stem 50–120 cm tall, erect, subcylindrical at base, ribbed-striated above, leafy, often blackish red, sparsely covered with branched hairs, sometimes branched above; branches never reaching the apex of the main stem. Upper leaf surface green, with scattered, stellate hairs, lower surface densely pubescent, rarely glabrous or subglabrous (var. *glabrescens* Hertw.) or white-tomentose (var. *tomentosum* G. Mey.); radical leaves long-petiolate, petioles sometimes up to 20 cm in length, lamina 15–30 cm long, 5–15 cm broad, cordate-ovate or cordate-oblong, subcordate or rounded at base, margin doubly crenate-dentate; middle cauline leaves petiolate; upper subsessile, ovate or lanceolate with cordate or truncate base, margin crenate-dentate. Inflorescence terminal, rather dense, generally unbranched raceme, sometimes with lateral branches; flowers in clusters of 5–10; clusters distant or crowded. Bracts linear, equal-  
150 ing longer pedicels or even exceeding them. Pedicels, along with bracts, pubescent, not thickening, the longer ones reaching 5–12 mm in length. Calyx 3.5–4 mm long, divided into narrow linear lobes almost to base. Corolla yellow (very rarely white), with brownish spots in throat, pellucid glands present, stellate-hairy outside. Anterior filaments glabrous above, densely covered with violet papilliform hairs at base, the three posterior filaments covered with similar hairs throughout; anthers all reniform. Style glabrous or diffuse-pilose at base; stigma depressed subglobose. Capsule broadly ellipsoid-obovoid, 4–5 mm long, obtuse, without beak, slightly longer or nearly twice as long as calyx; pubescence of capsule persistent. June to July.

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\* Wrongly marked 29 in the original text—Translator.



Along precipices, steep river banks, rarely in pastures.—*European USSR*: Dvina-Pechora (Syktyvkar and further south), Ladoga-Ilmen, Baltic Region, Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Transcaucasia, Bessarabia, Black Sea Region. *Caucasus*: all the available data in the literature need verification; I have not seen reliable herbarium specimens from the Caucasus; *Western Siberia*: Upper Tobol, Ob' Region, Irtysh; *Eastern Siberia*: Yenisey. *General distribution*: Scandinavia (south), Atlantic Europe, Mediterranean Region, Balkan States. Described from Western Europe. Type in London.

Hybrids: *V. nigrum*  $\times$  *thapsus* (= *V. collinum* Schrad.) is found wherever both species grow together; *V. nigrum*  $\times$  *phoeniceum*.

*Note*. The following varieties are distinguished on the basis of differences in their pubescence: var. *tomentosum* G. Mey. (= *V. alopecurus* Thuill.)—lower leaf surface densely tomentose; var. *glabreskens* Hartm.—lower leaf surface glabrous or subglabrous. It is doubtful whether the plant reported from the eastern Carpathians and named *V. lanatum* Schrad. is related to this species.

29. *V. wilhelmsianum* C. Koch in Linnaea, XXII (1849) 724; Murb. Monogr. 435.—*V. dechianum* Somm. and Lev. in Nuov. Giorn. Bot. Ital. (nouv. ser.) IV (1897) 200; Wulff in Izv. Kavk. muzeya. XI, 13; Grossh. Fl. Kavk. III, 369.—*lc.*: Dechy, Kauk. III, 99, tab. XIX.

Perennial. Plant softly tomentose throughout. Stem 70–100 cm tall, erect, ribbed toward apex, sparsely leafy, simple or with a few branches near apex. All leaves greenish above with branched, hairs, densely tomentose beneath; radical leaves petiolate, petioles 6–8 cm long, lamina 12–22 cm long, 6–10 cm broad, oblong or oblong-ovate, subobtusate, narrowed toward base, sometimes suborbicular, crenate-dentate; middle cauline leaves smaller, sessile; upper leaves with truncate or subcordate base, often glandular hairy. Inflorescence dense raceme, simple or with 151 short branches; clusters usually of 4 flowers each, crowded at first, later somewhat spaced. Bracts lanceolate or linear, caducous, equaling pedicels. Pedicels slender, densely pubescent, longer, finally up to 12(20) mm long. Calyx 4.5–6 mm long, densely pubescent, rarely subglabrous, but covered with glands, divided into broad, ovate-lanceolate lobes almost up to base, often reddish toward apex. Corolla yellow, 20–30 mm across, without pellucid glands, softly pilose outside. All filaments entirely covered with violet, rarely whitish (var. *leucotrichandrum* Bordz. and Murb.) papilliform hairs; anthers all similar, reniform. Style pubescent at base. Capsule globose, 4.5–5 mm in diameter, densely pubescent, without beak, slightly longer than calyx or shorter. June to July.

In subalpine and forest pastures in upper mountain zone.—*Caucasus*: Ciscaucasia, Dagestan, eastern Transcaucasia (Gori, southern Ossetia).



Endemic. Described from Georgia from the Wilhelms collections. Type in Berlin.

*Note.* Murbeck has described the hybrid *V. orientale*  $\times$  *wilhelmsianum* from the collections of N.A. Busch (Balkaria, northern Caucasus); however, *V. orientale* is not found in the region indicated, and the hybrid described is therefore undoubtedly *V. laxum*  $\times$  *wilhelmsianum*.

30. *V. szovitsianum* Boiss. Fl. or. IV (1879) 333; Grossh. Fl. Kavk. III, 333; Murb. Monogr. 455.

Biennial. Plant densely soft grayish white-tomentose throughout. Stem 45–70(100) cm tall, cylindrical, leafy, finally partly glabrescent, pyramidally branched toward apex. Leaves white-tomentose on both surfaces, later somewhat glabrescent and greenish above; radical leaves with 3–7 cm long petioles, lamina ovate or oblong, 6–17 cm long, 3–6 cm broad, obtuse, base rounded or cuneate, coarsely crenate or crispate; middle cauline leaves oblong-elliptical, short-petiolate; upper leaves triangular-ovate, short-acuminate. Inflorescence paniculate, floral clusters sparsely arranged from the beginning; each cluster 3–7-flowered; bracts lanceolate, acute; peduncle of whole cluster 10–20 mm long, much longer than bract. Pedicel of central flower 3–8 mm long; of lateral flowers in cluster also rather long, with 2 bracteoles; pedicel of other flowers in cluster 4–10 mm long. Calyx broadly ovoid or infundibuliform, 5–7 mm long, 3/4 or more divided into elliptic-ovate lobes, sometimes densely glandular-hairy (var. *adenothyrsus* Murb.). Corolla yellow, 16–25 mm in across, without pel-  
152 lucid glands, softly tomentose outside. Two anterior filaments glabrous at base and apex, their remaining part and other filaments densely covered with papilliform white hairs. Style pubescent at base; stigma semiglobose. Capsule subglobose, about 5 mm in diameter, densely tomentose, apiculate, scarcely longer than calyx. June to August.

On stony slopes, in the steppe on foothills. *Caucasus*: southern Transcaucasia (Yerevan), eastern Transcaucasia (Karabakh). *General distribution*: northwestern Iran. Described from eastern Karabakh from collections of Szovits. Type in Leningrad.

31. *V. cedreti* Boiss. Diagn. pl. or. II, 12 (1853) 19; Fl. or. IV, 328; Wulff in Izv. Kavk. muzeya, XI, 65; Grossh. Fl. Kavk. III, 365; Murb. Monogr. 469.—*Exs.*: Kotschy, Iter. syr. in 1855, No. 672, 1245.

Biennial. Plant grayish or yellowish white throughout due to pubescence, sometimes very dense, sometimes sparse and shedding in flakes, especially toward apex. Stem 40–90 cm tall, cylindrical, leafy, branched from middle or sometimes almost from base; branches later often subglabrous. Radical leaves with 2.5–8 mm long petioles, lamina 5–20 cm long, 3–10 cm broad, ovate or oblong-ovate, obtuse or subobtuse,

crenate, densely tomentose on both surfaces when young, upper surface later glabrescent or nearly so; upper cauline leaves much smaller than lower and middle ones, ovate, acute or acuminate. Inflorescence paniculate, lax, profusely branched; clusters usually 2–3-flowered, rarely 4 or more flowers in cluster; clusters regularly spaced, forming very lax racemes after flowering. Bracts linear, shorter than clusters. Pedicel of primary flower in cluster 2–5(7) mm long, generally without bracteoles; sometimes 2 small bracteoles developing in clusters with more flowers. Calyx 3–4 mm long, finally subglabrous, divided into linear, obtuse lobes almost up to base, glandular along margin. Corolla yellow, 15–30 mm across, with pellucid glands, floccose-pubescent outside. Anterior filaments glabrous near tip, their remaining part and other filaments densely covered with papilliform hairs, usually whitish, but sometimes to some extent intermixed with purple-violet hairs; anthers all similar, reniform. Style sparsely pubescent at base. Capsule 5–7 mm long, oblong-ellipsoid, obtuse, with long slender beak, later glabrescent. June to July.

On stony slopes.—*Caucasus*: possibly in western Transcaucasia (reported from Artvin District, near the village of Charbist). *General distribution*: Asia Minor. Described from Lebanon. Type in Geneva.

32. *V. erivanicum* Wulff in Izv. Kavk. muzeya, XI (1917) 2, 13; Grossh. Fl. Kavk. III, 364; Murb. Monogr. 474.—*lc.*: Wulff, l.c. Plate VII.

Biennial. Lower part of plant grayish-tomentose with stellate hairs, upper part glandular. Stem 30–60 cm tall, erect, cylindrical, leafy, branched from middle or base. Both leaf surfaces densely grayish or yellowish tomentose; radical leaves on 2–5 cm long petioles, lamina 5–10 cm long, 2–4 cm broad, oblong or oblong-ovate, obtuse, entire or remotely crenate, sometimes obscurely sinuate; upper cauline leaves sessile, subcordate at base; uppermost leaves glandular-hairy. Inflorescence lax, paniculate, sparsely branched, elongated; flowers at tips of inflorescence branches often borne singly, others in clusters of 2–3; clusters subsequently distant, later regularly spaced. Bracts lanceolate, subacute, longer than pedicels in fruit, glandular beneath. Pedicels 2–5 mm long, 5–8 mm long in fruit, thickened, without bracteoles. Calyx at first 4–5 mm long, finally up to 6.5 mm long, densely glandular, divided into oblong-linear lobes almost to base. Corolla yellow, incurved, 10–12 mm across, without pellucid glands, stellate-pubescent outside. Anterior filaments glabrous near tip, their remaining part and other filaments densely covered with purple-violet papilliform hairs. Style pubescent at base. Capsule 5–7 mm long, oblong-ovoid, subacute, stellate-pubescent, pointed, scarcely longer than calyx. June.

On stony slopes. *Caucasus*: southern Transcaucasia (near Ordubad). Endemic. Described from the place indicated. Type in Tbilisi.

33. *V. paniculatum* Wulff in Izv. Kavk. muzeya, XI (1917) 3, 14; Grossh. Fl. Kavk. III, 34; Murb. Monogr. 475.—*lc.*: Wulff, l.c. Plate VII.

Biennial. Stem 60–100 cm tall; lower part gray-tomentose with stellate hairs. Radical leaves with 2–4 cm long petioles, lamina oblong, 6–20 cm long, 2–5 cm broad, obtuse, crenate or sinuate, base cuneate; upper cauline leaves sessile, oblong or ovate-lanceolate, subacute, subentire. Inflorescence profusely branched, very lax, paniculate, with slender virgate branches; terminal flowers borne singly, the others generally in pairs, regularly spaced even during flowering stage, later more distant, inflorescence branches glandular. Bracts ovate-lanceolate,  $1/6$ – $1/2$  as long as pedicel in fruit. Pedicels without bracteoles, with stellate and glandular hairs, suberect or patent, 5–6 mm long at first, 7–10 mm in fruit, slightly thickened. Calyx 2–4 mm long, densely glandular, divided almost up to base into ovate or broadly lanceolate, acute lobes. Corolla  
154 yellow, rotate, about 12 mm across, without pellucid glands, stellate-tomentose outside. Anterior filaments glabrous at tip, their remaining part and other filaments densely covered with purple-violet papilliform hairs; anthers all similar, reniform. Style pubescent at base. Capsule 3–4 mm long, ellipsoidal-ovoid, obtuse, stellate-pubescent, spinulose, almost twice as long as calyx.

*Caucasus*: southern Transcaucasia (Nakhichevan ASSR, Araks river valley). Endemic. Described from the region between Negram and Darasham railway stations. Type in Leningrad.

34. *V. transcausicum* Wulff in Izv. Kavk. muzeya. XI (1917) 5, 14; Grossh. Fl. Kavk. III, 364; Murb. Monogr. 477.—*lc.*: Wulff, l.c. Plate VII.

Biennial. Plant covered with soft, branched hairs throughout. Stem about 100 cm tall, erect, subcylindrical, subglabrous above, branched below middle. All leaves sparsely yellowish pubescent, densely so below; radical leaves with 2–4 cm long petioles, lamina 20–30 cm long, 4–7 cm broad, oblong-lanceolate, coarsely crenate above middle, base narrowly cuneate; cauline leaves sessile, obscurely crenate, lower leaves oblong-lanceolate, upper ovate or ovate-lanceolate, subamplexicaul. Inflorescence profusely branched, paniculate, lax; flowers usually in cluster of 2–3, but borne singly at branch apexes; floral clusters regularly spaced even during early flowering stage, finally more distant. Lower bracts narrow-lanceolate, rest linear, all covered with soft hairs and glands. Pedicels without bracteoles (with 2 bracteoles only in primary flower of 4-flowered clusters), 2–3 mm long at first, finally up to 5 mm. Calyx at first 4–5 mm long, finally 6 mm, densely pilose and diffusely glandular, divided up to base into linear lobes. Corolla yellow, rotate, 25–30 mm across, without pellucid glands, slightly pubescent outside. Stamens usually 4; anterior filaments



glabrous at tip, their remaining part and other filaments densely covered with purple-violet papilliform hairs; anthers all similar, reniform. Style slightly pubescent at base. Capsule oblong-pyramidal, densely pubescent.

On stony slopes. *Caucasus*: possibly in southern Transcaucasia (reported from Kagyzman District). Type in Leningrad.

35. *V. alpigenum* C. Koch in Linnaea, XVII (1849) 724; Grossh. Fl. Kavk. III, 362.—*V. holmbergii* Murb. Monogr. (1933) 490.—*lc.*: Murb. l.c. tab. XXVI.

- 155 Perennial. Plant greenish throughout, lower part covered with branched hairs, upper subglabrous. Stem 60–120 cm tall, cylindrical, slightly ribbed, reddish, sparsely leafy. All leaves green on both surfaces, upper surface subglabrous or with scattered stellate hairs, lower surface more densely pubescent, especially along veins; radical leaves with 3–7 cm long petioles, lamina ovate or oblong-lanceolate, 15–30 cm long, 5–10 cm broad, obtuse, coarsely crenate, tapering and winged toward base, decurrent on petiole; middle cauline leaves smaller, subsessile, ovate- or oblong-elliptical, obtuse, with rounded or subcordate-sinuate base; upper leaves sessile. Inflorescence profusely branched, lax, paniculate, rarely branches reduced, floral clusters regularly spaced; flowers borne singly or in clusters of 2–4. Bracts linear-subulate, shorter than pedicel of primary flower in cluster, glabrous or with very minute glands along margins. Pedicels slender, filiform, later 5–10 mm long, glabrous or with scattered hairs, without bracteoles, rarely with 2 small bracteoles in primary flower. Calyx 3–4.5 mm long, glabrous outside, divided up to base into ovate or oblong-elliptical apiculate lobes, sometimes with very minute glands along margin. Corolla yellow, 16–22(25) mm across, with pellucid glands, glabrous outside and within. All filaments covered with whitish papilliform hairs; anthers all similar, reniform. Style glabrous at base. Capsule globose-ellipsoid, about 4 mm long, glabrous or sparsely pubescent at style base, slightly longer than calyx. June to July.

In high mountain and subalpine pastures.—*Caucasus*: western Transcaucasia (Adzharo-Imeretinsky Range), southern Transcaucasia. Endemic. Described from the region indicated from Koch's collections and later again under the name *V. holmbergii* Murb. from Holmberg's collections at the Goderz Pass. Type in Berlin (Koch's specimen).

Section 2. *Singuliflora* Murb. Monogr. (1933) 33.—Flowers in inflorescence not in clusters. Anthers all similar, reniform, or oblong and deccurrent in 2 anterior stamens.

- |   |                             |
|---|-----------------------------|
| 1. Flowers violet .....   | 45. <i>V. phoeniceum</i> L. |
| + Flowers yellow, rarely reddish .....                          | 2.                          |
| 2. Anthers of anterior stamens not decurrent on filaments ..... | 3.                          |



- + Anthers of anterior stamens decurrent on filaments. .... 6.
- 3. Inflorescence simple raceme, sometimes with a few short branches at base ..... 4.
- + Inflorescence profusely branched panicle ..... 5.
- 4. Flowers sessile ..... 38. *V. saccatum* C. Koch.
- 156 + Flowers pedicellate ..... 46. *V. flavidum* (Boiss.) Freyn and Bornm.
- 5. Radical leaves acuminate; corolla about 30 mm long, stamens 5 ....  
..... *V. pyramidatum* M.B.
- + Radical leaves obtuse; corolla 10–20 mm across; stamens always 4  
..... 42. *V. oreophilum* C. Koch.
- 6. Flowers sessile ..... 7.
- + Flowers pedicellate ..... 8.
- 7. Filaments connate, forming a tube at base; corolla yellow with dark  
violet patch inside; filaments and their hairs purple-violet .....  
..... 37. *V. formosum* Fisch.
- + Filaments free from base, yellow or orange, filament hairs also yel-  
lowish; corolla without dark patch inside .. 36. *V. ovalifolium* Don.
- 8. Inflorescence somewhat branched 39. *V. punalense* Boiss. and Buhse.
- + Inflorescence not branched ..... 9.
- 9. Stem more or less villous, and with short glandular hairs .....  
..... 40. *V. spectabile* M.B.
- + Stem glabrous or with glandular hairs ..... 10.
- 10. Capsule 5–7 mm in diameter ..... 44. *B. blattaria* L.
- + Capsule 7–9 mm in diameter ..... 43. *V. macrocarpum* Boiss.

36. *V. ovalifolium* Don. in Sims. Bot. Mag. XXIII (1807) 1051; Ldb. Fl. Ross. III, 185; Boiss. Fl. or. IV, 306; Schmalh. Fl. II, 257; Grossh. Fl. Kavk. III, 360; Murb. Monogr. 494.—*V. compactum* M.B. Fl. taur.-cauc. I (1808) 159.—*V. crenatifolium* Boiss. Fl. or. IV, 306, non Don.—*Id.*: Sims. Bot. Mag. XXVI, tab. 1037.—*Exs.*: Callier, Iter. taur. VII, No. 684.

- Annual. Stem 30–100 cm tall, erect, cylindrical or slightly angular-striated above, leafy, tomentose, later glabrescent, reddish in the lower part, usually branched above. All leaves greenish above with scattered, partially stellate hairs or subglabrous, somewhat densely grayish tomentose beneath; radical leaves with 2–8 cm long petioles, lamina ovate- or oblong-lanceolate, 5–20 cm long, 2–9 cm broad, obtuse or subacute, cuneate at base, coarsely and deeply crenate; middle cauline leaves subsessile, ovate or oblong-lanceolate, crenate-dentate; upper leaves dentate, subamplexicaul or ovate-cordate, cuspidate, sometimes oblong-  
157 lanceolate, gradually tapering toward apex. Inflorescence simple, dense spike, or sparsely branched panicle; flowers in bract axils always borne singly, sessile. Bracts equaling calyx or slightly longer, suborbicular or ovate-lanceolate, gradually tapering. Calyx with two 7–12 mm long,

lanceolate or ovate bracteoles at base, divided to the base into lanceolate lobes. Corolla yellow, up to 40 mm across, with pellucid glands, somewhat densely pubescent outside. Anterior filaments glabrous or puberulent along inner margin or partly covered with long, orange, papilliform hairs; three posterior filaments glabrous at base, elsewhere densely covered with orange or yellowish hairs clavately thickened above; anthers of anterior stamens somewhat long decurrent on filaments. Style pubescent at base; stigma spatulate, generally decurrent. Capsule globose or pyramidal-obovoid, 5–7 mm long, later generally glabrescent, usually shorter than calyx, very short-apiculate. June to July.

In steppes, usually sandy, in meadows, sometimes near roads. *European USSR*: Black Sea Region, Bessarabia, Lower Don, Crimea; *Caucasus*: Ciscaucasia (from lower reaches of Kuban and Stavropol to Praskoveya on the Kuma River and Nogai steppe). *General distribution*: Balkan States. Described from a cultivated specimen from the Caucasus (Montes Caucasi), introduced in the cultivation by Loddiger in 1804. Type not known.

37. *V. formosum* Fisch. in Catal. pl. hort. Gorenk. (1812) 25, nomen; Schrank, Pl. rar. hort. Monac. I, 22; Schrad. Monogr. II, 36; Murb. Monogr. 498.—*V. ovalifolium* Ldb. Fl. Ross. III, 195, p.p.; Boiss. Fl. or. IV, 306, p.p.— *Ic.*: Bot. Reg. VII, tab. 558; Schrank, l.c. Tab. 22.—*Exs.*: Herb. Fl. Cauc. No. 141.

Biennial. Plant white or grayish throughout, but glabrescent later. Stem 25–80 cm tall, erect, cylindrical leafy, simple or with a few short branches near the apex. All leaves finally greenish above, rather densely grayish white-tomentose beneath; radical leaves with 5–10 cm long petioles, lamina 6–20 cm long, 3.5–10 cm broad, ovate or oblong-ovate, rounded or truncate at base, crenate, often with two small free auricles; middle cauline leaves subsessile, ovate; upper leaves broadly ovate or cordate, short-cuspidate. Inflorescence compact spicate raceme at first, later lax, sometimes with short lateral branches at base; flowers borne singly in bract axils, sessile. Lower bracts broadly ovate, cuspidate, others lanceolate, as long as calyx. Calyx with two lanceolate bracteoles at base, 9–13 mm long, campanulate-globose, 2/3 or 3/4 divided into broadly triangular-lanceolate lobes. Corolla 30–60 mm across, yellow, with dark violet patch in middle, pellucid glands almost absent, pubescent outside. All filaments dark violet, connate into a tube at base; two anterior filaments glabrous or partly with long dark violet papilliform hairs; tips of filaments also white-hairy; anthers of anterior stamens generally long decurrent. Style densely pubescent at base. Capsule subglobose, about 7 mm long and broad, densely tomentose, short-apiculate, shorter than calyx. June to July.

On stony slopes.—*European USSR*: Crimea? (specimen of doubtful origin from Lindeman's herbarium, now in the Vienna Natural History Museum, as stated by Murbeck). *Caucasus*: Dagestan, eastern Transcaucasia. *General distribution*: Armenia-Kurdistan (?). Described from Crimea (?) (and the Caucasus) 'Iberia' (from specimens of Steven and Ledebour (?)). Type not known.

*Hybrid*: *V. formosum* × *pyramidatum* (= *V. ovalifolium* × *pyramidatum* Troitzky = *V. samoneum* Troitzky in Zap. Nauchno-prikl. otd. Tifl. bot. sada VII (1930) 67).

*Economic importance*: Extremely beautiful ornamental that fully deserves to be cultivated for its striking flowers. As reported by N.A. Troitzky, the hybrid of this species with *V. pyramidatum* is the most decorative among those discovered in Transcaucasia.

38. *V. saccatum* C. Koch in Linnaea, XVII (1843) 283 and XXII (1849) 722; Ldb. Fl. Ross. III, 197; Grossh. Fl. Kavk. III, 362; Murb. Monogr. 504.—*V. molle* C. Koch in Linnaea, XVII (1843) 284 and XXII (1849) 727; Ldb. l.c. 197.—*V. stevenii* Boiss and Buhse in Nouv. Mém. Soc. Nat. Mosc. XII (1860) 160; Boiss. Fl. or. IV, 339; Grossh. l.c. 361.

Biennial. Plant grayish white-tomentose throughout. Stem 30–80 cm tall, erect, cylindrical, leafy, simple, sometimes with short branches at apex. Leaves greenish above, gray tomentose beneath due to dense stellate hairs; radical leaves with 2.5–5 cm long petioles, lamina 4–10 cm long, 2–4.5 cm broad, ovate or oblong-ovate, subobtuse, coarsely crenate, with ovate or cuneate base; middle cauline leaves subsessile, oblong, generally acute, crenate; upper leaves broadly-lanceolate, not decurrent. Inflorescence simple compact raceme, later a little lax; sometimes with short branches at base of inflorescence. Bracts sharply narrowed into spiny  
161 tips. Flowers always singly at nodes, somewhat regularly spaced, with two bracteoles at base, scarcely longer than calyx. Calyx 7–10 mm long, densely tomentose, deeply divided into ovate or broad-lanceolate lobes. Corolla yellow, 20–30(40) mm across, without pellucid glands, tomentose outside. All filaments covered with pale lilac (Murbeck, from living plants!) papilliform hairs, rarely two anterior filaments glabrous at tip; anthers all similar, reniform. Capsule subglobose, 5.5–6.5 mm in diameter, densely lanate-tomentose, nearly as long as calyx. May to June (Plate V).

On stony slopes, on shale, sometimes in thickets.—*Caucasus*: southern Transcaucasia (Yerevan, Nakhichevan). *General distribution*: Armenia-Kurdistan. Described from Armenia. Type in Berlin.

39. *V. punalense* Boiss. and Buhse in Nouv. Mém. Soc. Nat. Mosc. XII (1865) 161; Boiss. Fl. or. IV, 307; Grossh. Fl. Kavk. III, 361; Murb. Monogr. 513.



Plate V.  
*Verbascum saccatum* C. Koch, general appearance of the plant.



Biennial. Lower part of plant covered with rather long, soft, branched, wooly hairs; upper part, in addition, densely glandular-hairy. Stem 100–120 cm tall, cylindrical, leafy, profusely branched above. Leaves green above, sparsely pubescent, densely tomentose beneath; radical leaves short-petiolate, 40–60 cm long, oblong, coarsely crenate; cauline leaves sessile, smaller; upper cauline leaves oblong-ovate with truncate or subcordate base. Inflorescence profusely branched, paniculate; flowers singly at nodes, lower ones sometimes together in pairs, rarely three in lax cluster. Bracts generally longer than pedicels, broad, triangular-ovate, upper bracts lanceolate. Pedicels slender, 5–7(10) mm long. Calyx 5–8 mm long, densely glandular-hairy, divided up to base into ovate-elliptical lobes. Corolla yellow, 25–40 mm across, densely covered with pellucid glands, soft-pilose outside. Filament hairs long, violet; anthers of 2 anterior stamens short-decurrent on filaments. Style pilose at base, slightly thickened above. Capsule ovoid-globose or globose, pilose, slightly or twice as long as the calyx. August to October.

On mountain slopes.—*Caucasus*: Talysh; *Soviet Central Asia*: mountainous areas of Turkmenia (near Kyzyl-Arvat; specimen doubtful, since only leaves are available). *General distribution*: Iran. Described from vicinity of Tupal, in Gilan. Type in Leningrad.

*Note*. We are reporting this plant for Soviet Central Asia in accordance with Murbeck, who referred to this species the very incomplete specimens of Sintenis preserved in the herbaria of Weimar and Lund. Murbeck says that the Sintenis plant has only leaves, but by their form and, especially, their pubescence, these specimens are undoubtedly related to *V. punalense* Boiss. and Buhse, a view fully supported by Bornmüller.

In Talysh we saw typical specimens from the collections of Hohenacker, Monjuschko and others that are identical with Buhse's authentic specimens.

40. *V. spectabile* M.B. Fl. taur.-cauc. III (1819) 158; Ldb. Fl. Ross. III, 196. p.p.; Boiss. Fl. or. IV, 307; Schmalh. Fl. II, 257; Murb. Monogr. 514.

Biennial. Plant grayish green throughout soft-lanate in the lower part, glandular-hairy above. Stem 50–125 cm tall, erect, leafy, cylindrical or slightly ribbed above, simple, rarely sparsely puberulent toward apex. Radical leaves with 2–8(12) cm long petioles, lamina 8–20 cm long, 5–8 cm broad, oblong or oblong-ovate with cordate base, obtuse, coarsely crenate, both surfaces green, sparsely covered with branched hairs, densely so beneath, along veins; middle cauline leaves sessile or subsessile, acute; upper cauline leaves sessile, triangular-ovate, dentate, with cordate base and auricles, not decurrent, lower surface usually gray-tomentose. Inflorescence simple terminal raceme, rarely with a few short lateral branches at base;

inflorescence axis with viscid hairs, glandular as well as simple; flowers always singly at nodes. Bracts subulate, covered with glandular and simple hairs, equaling pedicels or longer. Pedicels slender, 5–7 mm long, finally 7–10 mm, without bracteoles. Calyx 5–7 mm, finally up to 10 mm, divided almost up to base, anterior lobes broad, posterior narrow, all lobes viscid-glandular. Corolla yellow, 35–40(45) mm across, pellucid glands almost absent, glandular- and stellate-hairy outside, inside bases of upper lobes of limb reddish brown and covered with violet hairs. Filaments dark violet with purple-violet hairs; anthers of anterior stamens oblong-ovate, long decurrent. Capsule 7–9 mm long, obovoid, with a short beak. June to July (Plate VI, fig. 2).

In mountain forests, mainly beech.—*European USSR*: Crimea (beech forests in mountain regions of Crimea); *Caucasus*: western and eastern Transcaucasia.—*General distribution*: Asia Minor, Armenia-Kurdistan. Described from southern Crimea. Type in Leningrad.

41. *V. pyramidatum* M.B. Fl. taur.-cauc. I (1808) 161; Ldb. Fl. Ross. III, 199; Boiss. Fl. or. IV, 340; Schmalh. Fl. II, 259; Grossh. Fl. Kavk. III, 362; Murb. Monogr. 536.—*lc.*: Sweet, Brit. Fl. Gard. tab. 31.

- 163 Perennial. Plant grayish green throughout, densely appressed-puberulent. Stem 50–150 cm tall, erect, leafy, ribbed toward apex. Inflorescence profusely branched. All leaves greenish above, somewhat densely stellate-hairy and minutely glandular; lower surface grayish, eglandular, with prominent veins; radical leaves large, with 2–8(12) cm long petioles, lamina 12–20 cm long, 5–8 cm broad, oblong or oblong-obovate, short-acuminate, crenate-dentate, gradually tapering toward base; middle cauline leaves subsessile, oblong or ovate, with cordate base; upper leaves sessile, broadly cordate, acuminate, dentate or serrate. Inflorescence profusely branched, paniculate; flowers always singly in bract axils, finally regularly spaced on inflorescence branches. Bracts narrowly lanceolate, acuminate, often glandular. Pedicels always ebracteolate, 3–6 mm long in fruit, upcurved, suberect, somewhat thick, pubescent. Calyx 3–4 mm long at early anthesis, finally a little longer, divided almost to base into unequal stellate-pubescent lobes; upper lobe oblong, short-acuminate, other lobes more or less broadly elliptical, apiculate. Corolla yellow, 22–30 mm across, pellucid glands almost absent, stellate-pubescent outside, with brown stripes in throat. Stamens generally 5, rarely 4; filaments orange, all covered throughout with violet papilliform hairs; anthers all similar, connective hairy on inner side. Style pubescent below, thickened above. Capsule 4–5 mm long, broad-obovoid, obtuse, without beak, densely pilose, slightly longer than calyx. May to July. (Plate VI, fig. 1.)

On stony slopes, in pastures along mountain rivers, rarely in fields. *European USSR*: Black Sea Region (reported by Andrzejowski from



Plate VI.

1. *Verbascum pyramidatum* M.B., portion of inflorescence. 2. *V. spectabile* M.B., portion of inflorescence.



Voznesensk on the Savran River bank but not seen by anyone else since), Crimea (southern bank); *Caucasus*: all regions. *General distribution*: Asia Minor, Armenia-Kurdistan. Described from the northern Caucasus Range. Type in Leningrad.

Hybrids: *V. pyramidatum*  $\times$  *songoricum*, *V. pyramidatum*  $\times$  *thapsus*.

42. *V. oreophilum* C. Koch in Linnaea, XXII (1849) 726.—*Celsia aurea* C. Koch, l.c. 731; Boiss. Fl. or. IV, 361; Murb. Monogr. Celsia (1925) 78.—*Celsia johannis* Bordz. in Vestn. Tifl. bot. sada, nov. ser. 5 (1931) 49 and in Izv. Kievsk. bot. sada, 13 (1931) 31; Grossh. Fl. Kavk. III, 367.—*V. johannis* Murb. Monogr. (1933) 542.—*V. aureum* O. Kuntze, Rev. gen. pl. (1891) 469; Murb. Monogr. 539.—*l.c.*: Murb. Monogr. Celsia, f. 1.

Perennial. Plant covered throughout with very short stellate hairs. Stem 70–120 cm tall, leafy, ribbed and branched above. Leaves all greenish above, yellowish or grayish pubescent beneath; radical leaves yellowish or grayish pubescent beneath; radical and lower cauline leaves with 2–8(12) cm long petioles, lamina oblong or obovate, acuminate, gradually narrowed into petiole, 12–20 cm long, 5–10 cm broad, crenate; middle cauline leaves sessile or subsessile, ovate; upper leaves ovate-lanceolate, acute. Inflorescence branched, paniculate, with lower branches often branched in turn at base; flowers borne singly rather densely arranged at first, later spaced apart. Bracts lanceolate-ovate, long acuminate, equaling or almost equaling pedicel in fruit on terminal branch of inflorescence. Flowers ebracteolate, pedicels 4–8 mm long in fruit, relatively slender. Calyx 4 mm long at first, later 6 mm long, 5-partite almost to base, lobes stellate-pubescent outside, inner side glandular, dissimilar: upper lobe oblong-lanceolate, lower lobes broadly obovate. Corolla yellow, 10–20 mm across, with pellucid glands, stellate-pubescent outside. Stamens 4, fifth rarely present and if so, generally remains underdeveloped; all filaments densely covered with purple-violet papilliform hairs; anthers generally all reniform. Capsule densely pubescent, 4.5–6 mm long, narrowly or ovoid-ellipsoid, longer than calyx, sometimes twice as long. June to August.

On stony slopes, on limestone and marl.—*Caucasus*: southern Transcaucasia. *General distribution*: Asia Minor (eastern Anatolia), Armenia-Kurdistan, Iran. Described from Anatolia. Type in Berlin.

43. *V. macrocarpum* Boiss. Diagn. Pl. or. II, 12 (1853) 6; Fl. or. IV, 308; Murb. Monogr. 557.

Biennial. Plant covered throughout with unequal glandular hairs, simple hairs altogether absent, lower part of plant sometimes eglandular. Stem 50–150(200) cm tall, erect, slightly ribbed, leafy, unbranched.



Radical leaves with narrow, 1–2 cm long petioles, lamina 8–20 cm long, 3.5–4.5 cm broad, ovate or broadly cuneate, coarsely crenate; cauline leaves smaller, middle leaves subsessile, upper leaves subauriculate-cordate at base, but not decurrent. Flowers in simple, finally much elongated, raceme, singly at nodes. Bracts triangular-ovate or ovate-lanceolate, 167 acuminate, usually longer than flowers, lower bracts sometimes dentate, upper subentire. Pedicels 3–6(8) mm long in fruit, somewhat thick, strong, suberect. Calyx 7–10 mm long, divided up to base; anterior calyx lobes elliptic-oblong, posterior narrow-oblong, all pointed. Corolla yellow, 25–30 mm across, without pellucid glands, densely glandular-hairy outside, with violet and white papillae inside at base of upper lobes. Stamens generally 5, the middle one sometimes underdeveloped; filaments with long violet hairs; anthers of anterior stamens decurrent. Capsule subglobose, 7–9 mm in diameter, scarcely exceeding calyx. May to June.

*Caucasus*: western and southern Transcaucasia (Armenia, near Vagharshapat); *Soviet Central Asia*: Dzh.-Tarbagatai, mountainous Turkmenia, Tien Shan (near Arslanbob). *General distribution*: Iran. Described from Iran. Type in Geneva.

*Note*. Well distinguished from related *V. blattaria* by a larger capsule; the feature indicated by Murbeck—presence of glandular hairs all over stem—is less constant.

44. *V. blattaria* L. Sp. pl. (1753) 178; Ldb. Fl. Ross. III, 196; Boiss. Fl. or. IV, 345; Schmalh. Fl. II, 257; Grossh. Fl. Kavk. III, 361; Murb. Monogr. 560.—*lc.*: Sibth. and Sm. Fl. gr. VI, 393; Rchb. Ic. fl. Germ. XX, tab. 12.—*Exs.*: Billot, Fl. gall. and germ. exs. No. 56.

Biennial, rarely annual. Plant glabrous, only upper part sometimes with some glands or glandular hairs. Stem 30–120 cm tall, erect, leafy, slightly ribbed above, simple sometimes with few lateral branches above. Radical leaves sessile or shortly petiolate, lamina oblong, (7)10–12 cm long, 1.5–2.5 cm broad, sometimes pinnatifid at base with crenate-dentate margin; cauline leaves subsessile, gradually becoming shorter upward, upper leaves oblong-lanceolate, acute, generally amplexicaul at base, not decurrent. Inflorescence a simple, elongated lax raceme; flowers borne singly at nodes. Bracts acuminate, lower bracts ovate, dentate, sometimes equaling pedicel, upper bracts lanceolate, entire, many times shorter than pedicel, often glandular-hairy. Pedicels 10–20(25) mm long, rarely very short (var. *brevipedicellatum* Hal.). Calyx 5–8 mm long, glandular or glabrous, divided almost to base into narrowly lanceolate lobes. Corolla 25–30 mm across, yellowish brown, generally glandular outside, with violet papillae inside at base of upper lobes. Filaments with long violet hairs; anthers of 2 anterior stamens decurrent. Capsule globose, glandular. July to August.

On hills, sandy places, river banks, in gardens, steppes with alkali  
 168 soils, less frequently plowed fields, rice fields and kitchens gardens  
 as weed. *European USSR*: Upper Dnieper, Middle Dnieper, Volga-Don,  
 Trans-Volga Region, Black Sea Region, Crimea, Lower Volga; *Caucasus*:  
 Ciscaucasia, Dagestan, western, southern and eastern Transcaucasia,  
 Talysh; *Western Siberia*: Upper Tobol; *Soviet Central Asia*: Aral-Caspian  
 Region, Baltic Region, Dzh.-Tarbagatai, Kyzyl-Kum (north), Kara Kum,  
 Syr Darya, Amu Darya, Pamiro-Alai, Tien Shan. *General distribution*:  
 Southern, Atlantic and Central Europe, Mediterranean Region, Balkan  
 States-Asia Minor. Described from southern Europe. Type in London.

45. *V. phoeniceum* L. Sp. pl. (1753) 178; Ldb. Fl. Ross. III, 202;  
 Boiss. Fl. or. IV, 346; Schmalh. Fl. II, 262; Grossh. Fl. Kavk. III,  
 362; Murb. Monogr. 582; Kryl. Fl. Zap. Sib. IX, 2414.—*V. spectabile*  
*β. foliosum* C. Koch in Linnaea, XXII (1849) 730 (quoad pl. e  
 Daghestania).—*Celsia atrovioleacea* Somm. and Lev. in Nouv. Giorn. Bot.  
 Ital. (nouv. ser.) IX (1897) 201; Tr. Bot. sada XVI (1900) 358 (forma  
 monstrosa).—*V. atrovioleaceum* Murb. in Mag. Bot. Lap. (1925) 31 and  
 in Monogr. 591, cf. Murbeck, Weitere Stud. Verbasc. u. Celsia (1939)  
 41.—*fc.*: Bot. Mag. tab. 885; Rchb. Ic. fl. Germ. XX, tab. 31, I; Dechy,  
 Kauk. III, tab. XVIII (*Celsia atrovioleacea*).—*Exs.*: Schultz, Herb. norm.  
 No. 103; Fl. pol. exs. No. 466; GRF. No. 277.

Perennial. Plant with generally rigid hairs below, rather densely glandular above. Root generally thickened above. Stem 30–100 cm tall, erect, slender, cylindrical or slightly nodular, sparsely leafy or nearly leafless, sometimes sparsely branched toward tip; lower part covered with articulate or crispate hairs, eglandular or sparsely glandular, generally densely glandular-hairy above, including inflorescence. Leaves almost all radical, petioles 4–40 mm long, lamina of radical leaves 4–10 cm long, 2–10 cm broad, subcordate or oblong-ovate, remotely coarsely crenate or subentire, with scattered hairs on both surfaces; cauline leaves very few or altogether absent, much smaller, more or less pubescent on both surfaces; lower cauline leaves oblong or oblong-lanceolate, generally shortly petiolate, upper leaves sessile, often subamplexicaul. Inflorescence simple lax raceme, sometimes with lateral branches; flowers always singly at nodes. Bracts generally lanceolate, acute, sometimes almost setiform, rarely ovate-triangular and dentate at base, shorter than pedicels in fruit. Pedicels in fruit 10–30 mm long, slender, distant. Calyx 3–6 mm long, glandular-hairy, divided up to base into elliptical or oblong-linear lobes. Corolla violet (very rarely white), 25–30(35) mm across; without pellucid  
 169 glands, glabrous outside, rarely glandular-hairy. All filaments covered with long violet papilliform hairs; upper stamens sometimes white-pubescent; anthers all reniform. Style glabrous or sparsely glandular at base; stigma

semiglobose. Capsule 4.5–6 mm long, broadly pyramidal-obovoid, subacute, rarely globose-ellipsoid, obtuse, glabrous or sparsely glandular. June to July.

In grassy as well as dry steppes; sometimes in river valleys. Introduced far into north. *European USSR*: Carpathia-Lapland (introduced in Khibiny), Baltic Region, Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Trans-Volga Region, Bessarabia, Black Sea Region, Crimea, Lower Don, Lower Volga; *Caucasus*: Ciscaucasia, Dagestan, eastern and southern Transcaucasia, Talysh?; *Western Siberia*: Upper Tobol (Chkalovsk dist.), Irtysh, Altai (south); *Soviet Central Asia*: Aral-Caspian Region, Dzh.-Tarbagatai, Tien Shan. *General distribution*: Central Europe (southward as far as central Italy?), Balkan States-Asia Minor (Olty), northern Iran, Dzh.-Kashgar. Described from Central Europe. Type in London.

Hybrids: *V. phoeniceum* × *pyramidatum* (= *V. eriocarpum* Freyn and Sint., *V. caucasicum* Bornm.), *V. phoeniceum* × *songoricum* (= *V. candelabrum* Kar. and Kir.).

*V. tauricum* Hook. is also one of the hybrids of this species [Bot. Mag. tab. 3799 (1841)]; in general appearance, its habit is similar to that of *V. spectabile*, and this plant is probably the hybrid *V. phoeniceum* × *spectabile*. Described from cultivated specimen from Edinburgh Botanical Gardens and, judging from specific name, it originated from Crimea.

*Note*. N.V. Pavlov [Fl. Tsentr. Kazakhst. III (1938) 131], when describing *V. phoeniceum*, says "one more similar, though uncommon, species of this genus, *V. australe* Pavl., can be found in the south of the USSR, which is usually mistaken for *V. blattaria* L.; plant often branched or only inflorescence branched, branches being leafless; leaves glabrous or subglabrous, lower leaves petiolate, upper gradually reduced, sessile, inflorescence racemose, very long, generally glandular-pubescent, viscid, flowers subsessile, 2 in cluster or rarely 3, pink or yellow, filaments wooly-violet. Grows generally in damp marshy places."

However, in this case there seems to be some misunderstanding since: 1) the name *australe* has been used twice in the botanical literature, first by Schrader, and then by Gussone; 2) the author has not indicated either the range of his 'new species', or the specimens on which his description is based; 3) on the basis of the author's description, which is very incomplete, it is not possible to visualize them. The author's statement that the flowers are borne in 2s or 3s shows that it is neither typical *V. phoeniceum* nor typical *V. blattaria*, but rather some hybrid with one of the species related to the section having several flowers in a cluster.

*Economic importance*: Often cultivated in gardens as an ornamental; very beautiful flowering plant; cultivated as an annual.



- 170 46. *V. flavidum* (Boiss.) Freyn and Bornm. in Oesterr. Bot. Zeitschr. 40 (1890), Separ. 17; Grossh. Fl. Kavk. III, 262.—*V. phoeniceum* var. *chloranthum* Boiss. and Buhse in Mém. Soc. Nat. Mosc. (1860) 162.—*V. phoeniceum*  $\beta$ . *flavidum* Boiss. Fl. or. IV (1879) 346.—*V. phoeniceum* ssp. *flavidum* Bornm. in Engl. Bot. Jahrb. LXI, Beibl. (1928) 140; Murb. Monogr. 585.

Perennial. Very similar to preceding species (*V. phoeniceum*), from which it is distinguished by leaves that are villous-asperate beneath, long-acuminate and oblong-ovate, by longer capsule, twice as long as calyx and, finally, by color of corolla, which is yellowish, greenish yellow or brick-red. June to July.

In steppes.—*Caucasus*: southern Transcaucasia. *General distribution*: Balkan States-Asia Minor (Macedonia, Hellespont (Dardanelles)), Armenia-Kurdistan, Iran. Described, in Buhse's collection, from Mt. Alagez. Type in Leningrad.

### Genus 1324. *CELSIA*<sup>1, 2</sup> L.

L. Gen. pl. ed. 5 (1754) 272; Murb. Monogr. in Acta Reg. Soc. Lund. XXVII (1926). —*Verbascum* O. Ktze. Rev. gen. (1891) 469 p.p.

Calyx 5-partite. Corolla 5 lobed, almost regular, generally yellow, with very short or indistinct tube, limb flat, rotate. Stamens 4, fifth stamen absent or represented by a staminode; all filaments similar or 2 anterior ones longer. Style filiform or somewhat clavately thickened at apex; stigma emarginate or bifid. Monocarpic or polycarpic plants, rarely semishrubs with dentate or pinnatifid, rarely entire, leaves. Inflorescence terminal raceme; flowers numerous.

The genus includes nearly 60 species, distributed in Mediterranean Region, India, Abyssinia and South Africa.

*Note.* Genus *Celsia* is so similar to genus *Verbascum* and their formal difference (5 stamens in *Verbascum* and 4 stamens in *Celsia*) is so insignificant and even partly variable, that some authors, for example O. Kuntze, combine these two into single genus, *Verbascum*.

1. Pedicels not longer than calyx ..... 1. *C. orientalis* L.
- + Pedicels much longer than calyx ..... 2.
2. Flowers small, 4–6 mm across, numerous .. 2. *C. heterophylla* Desf.
- + Flowers larger, 15–22 mm across, fewer ..... 3.
3. Calyx 1/3–1/2 as long as pyriform-ovoid capsule ..... 3. *C. nudicaulis* (Wyd.) B. Fedtsch.

<sup>1</sup> Treatment by B.A. Fedtschenko.

<sup>2</sup> Named after the Swedish scientist Olaf Celsius, professor in Uppsala (1670–1756)



- + Calyx at least 2/3 as long as capsule; capsule subglobose .....  
 .....4. *C. suworowiana* C. Koch.

1. *C. orientalis* L. Sp. pl. (1753) 621; Ldb. Fl. Ross. III, 203; Boiss. Fl. or. IV, 360; Grossh. Fl. Kavk. III, 367; Murb. Monogr. 95.—*Verbascum orientale* O. Kuntze, Rev. gen. (1891) 469, non M.B.—*Ik.*: Sibth. and Sm. Fl. gr. VII, tab. 605; Jaub. and Spach, Illustr. pl. or. V, tab. 405; Rchb. Ic. fl. germ. XX, tab. 50, f. 1.—*Exs.*: Fl. austro-hung. exs. No. 162; Fl. Cauc. exs. No. 294.

Biennial. 20–70 cm tall. Stem erect, cylindrical, densely puberulent with recurved hairs, densely leafy, branched upward. Leaves sparsely puberulent or glabrous above; radical leaves petiolate, lamina obovate or oblonglobed or pinnatifid, 6–9 cm long, 1.5–2 cm broad; cauline leaves sessile or subsessile, oblong or ovate, pinnati- or bipinnatipartite. Inflorescence lax even at early flowering stage, more so toward later flowering stage; inflorescence axis, pedicels and calyces densely covered with sessile glands. Bracts glandular and puberulent; lower bracts much longer than calyx, but similar in form to upper leaves, 3- or 5-partite; bracts of upper flowers entire, scarcely longer than calyx. Pedicels 1. 5–5 mm long in fruit, erect or somewhat ascending, almost half as long as calyx, rarely slightly longer. Calyx teeth lanceolate-linear, sometimes with a small tooth in lower flowers of inflorescence. Corolla 16–18 mm across, lemon yellow, subglabrous outside, with a few brown dots inside near throat, sparsely ciliate-pubescent. Stamens 4, free, filaments covered with clavate papillae. Capsule ellipsoid, laterally compressed at apex. May to July.

On rocky slopes, sometimes on marl and limestone.—*European USSR*: Crimea (southern coast). *Caucasus*: western, southern and eastern Transcaucasia. *General distribution*: Mediterranean Region (east), Balkan States-Asia Minor, Armenia-Kurdistan, Iran. Described from Cappadocia and Armenia. Type in London.

2. *C. heterophylla* Desf. in Pers. Synon. II (1807) 161; Boiss. Fl. or. II, 359; Grossh. Fl. Kavk. III, 367; Murb. Monogr. (1926) 134.—*Verbascum heterophyllum* O. Kuntze, Rev. gen. (1891) 469.—*Ik.*: Jaub. and Spach, Illustr. pl. or. tab. 404.

Biennial. Plant 40–100 cm tall. Stem erect, leafy, densely glandular below, generally branched upward. Radical leaves petiolate, generally glandular-hairy, lamina oblong, up to 35 cm long, pinnati-partite or lyrate, 172 with 6–10 lobes on each side, terminal lobe larger; cauline leaves with shorter petioles, glabrous, with smaller and fewer lobes; upper leaves sessile, acute, subentire, sharply dentate or entire. Pedicels in fruit filiform, 8–20 mm long, 2–4 times as long as capsule, deflexed or upcurved. Calyx glabrous, lobes oblong-lanceolate, entire. Corolla yellow, 10–12 mm

across, glabrous outside or inside near base of upper lobes of limb. Stamens usually 4; anterior stamens slightly longer and thicker than posterior ones, glabrous above, lower part and posterior stamens densely covered with long clavate papillae, white below and violet above. Ovary glabrous. Capsule  $\frac{1}{3}$  or twice as long as calyx, subglobose, 3–4 mm long, not emarginate. May to July.

Along river valleys in lower mountain regions, on pebbly river beds, sometimes in dense thickets at isolated places; less frequently on dry slopes.—*Caucasus*: eastern and southern Transcaucasia, Talysh. *Soviet Central Asia*: Pamiro-Alai (near Samarkand. Hissar Range in Varzob River Valley). *General distribution*: Armenia-Kurdistan, Iran. Described from Armenia from Tournefort's collections. Type in Paris.

3. *C. nudicaulis* (Wydł.) B. Fedtsch. comb. nov.—*Scrophularia nudicaulis* Wydł. in Mém. Soc. Phys. Genève, IV (1828) 68.—*Celsia persica* C.A. Mey. Verz. Pflanz. Cauc. Casp. Meer. (1831) 111; Ldb. Fl. Ross. III, 1, 203; Boiss. Fl. or. IV, 355; Wulff in Izv. Kavk. muzeya, XI, 18; Murb. Monogr. 115; Grossh. Fl. Kavk. III, 367.

Perennial. Plant (20)30–70 cm tall, with thickened woody rootstock. Stems usually numerous from root neck, strong, erect, pubescent, branching above and forming long panicle inflorescences. Both leaf surfaces pubescent; radical leaves numerous, petiolate, lamina 4–7 cm long, 0.8–1.2 cm broad, generally pinnatisect, lobes lanceolate or oblong, dentate or pinnatisect; cauline similar in shape, but smaller and with shorter petiole, uppermost leaves sessile, linear-lanceolate, incised or crenate. Inflorescence lax even at early anthesis; axis usually glandular. Bracts covered with sessile glands,  $\frac{1}{8}$ – $\frac{1}{3}$  as long as pedicels in fruit, generally all entire. Pedicels sparsely glandular, 12–28 mm long, 2–4 times as long as capsule. Flowers yellow, 15–18 mm across, glabrous outside, sometimes with papilliform hairs inside. Anterior stamens longer, their filament bases and posterior filaments covered throughout with yellow and lilac colored papillae. Ovary densely covered with subsessile glands. Capsule pyriform-ovoid, 5–7 mm long, 3–5 mm broad. May to July.

On dry slopes; also on sandy slopes.—*Caucasus*: Dagestan, eastern and southern Transcaucasia, Talysh. *General distribution*: Armenia-Kurdistan, Iran. Described from Iran, from Mount Alwand. Type in Geneva.

*Note*. This plant is commonly known by the name *C. persica* C.A. Mey.; however, according to the rules of nomenclature, it should be named *C. nudicaulis* (Wydł.) B. Fedtsch.

4. *C. suworowiana* C. Koch in Linnaea XVII (1843) 284; Boiss. Fl. or. IV, 357; Wulff in Izv. Kavk. muzeya, XI, 18; Murb. Monogr. 18; Grossh. Fl. Kavk. III, 368.—*Exs.*: Pl. Cauc. No. 257.

Biennial or perennial. Plant (20)30–70 cm tall. Stem erect, simple, rarely with a few branches above, covered throughout with simple, recurved hairs or glandular-hairy above. Both leaf surfaces densely pubescent; radical leaves numerous, without glandular hairs, lamina lanceolate or oblong-ovate, 8–10 cm long, 3–4 cm broad, gradually tapering into broad, 3–4 cm long petiole, incised-serrate or lyrate-pinnate, rarely entire (var. *papillosa* Murb.); lower cauline leaves similar to radical leaves but with shorter petioles; upper cauline leaves sessile, linear-lanceolate. Raceme elongated even at early anthesis, axis glandular-hairy. Bracts lanceolate, entire or somewhat dentate,  $1/3$ – $1/2$  as long as pedicel in fruit, rarely only slightly shorter (var. *acuminata* Murb.). Pedicels glandular near calyx, remaining part glabrous, 20–35 mm long, 4–6 times as long as capsule. Corolla yellow, 16–20 mm across, glabrous or sparsely glandular outside, papillose inside at base of upper lobes. Anterior filaments slightly longer than posterior, with upper  $1/3$  part glabrous, lower  $2/3$  part and posterior filaments covered throughout with yellow and lilac-colored papillae. Capsule 5–5.5 mm long and 5 mm broad, subglobose. May to June.

Dry and wormwood steppe, sandy semidesert.—*Caucasus*: southern and eastern Transcaucasia. *General distribution*: Iran. Described from Yerevan district. Type in Berlin.

*Note*. In his treatment of the Caucasian species of *Verbascum* and *Celsia* (Izv. Kavk., muz. XI., 1937), Wulff cites incidentally, *C. coromandeliana* Vahl for Armenia, referring to the specimen collected by C. Koch (C. n. sp. Koch in regionibus trans Araxem, No. 668, 1837). The specimen is in the Herbarium of the Botanical Institute of Akad. Nauk USSR, and we are completely unable to distinguish it from many  
174 other specimens there under the name *C. suworowiana* C. Koch. It is interesting that there is another specimen here that is identical in appearance and labeled by Koch also *C. suworowiana*. I assume, therefore, that both these specimens belong to the same species.—*C. suworowiana*, being, moreover, the type of this species, *C. coromandeliana* should finally be excluded from the flora of the Caucasus and, generally, the USSR.

### Genus 1325. *STAUROPHRAGMA*<sup>1, 2</sup> Fisch. and Mey.

Fisch. and Mey. in Ind. sem. hort. Petrop. X (1843) 90

Calyx 5-partite, lobes subequal. Corolla with short tube, subrotate, 5-partite, with unequal lobes. Stamens 4, didynamous, all fertile, exserted,

<sup>1</sup> Treatment by S.G. Gorshkova.

<sup>2</sup> From the Greek *Stauros*—a cross, and *phragma*—a partition, indicating the shape of the fruit—an almost 4-locular capsule.



with hairy filaments, anthers reniform, unilocular, loculi confluent, adnate in the middle. Style simple, thickened above: stigma simple. Capsule cylindrical, almost nondehiscent, later bivalvular, valves reflexed along margins, almost 4-locular, many-seeded. Placenta 4-partite. Seeds pitted rugose. Herbaceous plants with wooly leaves.

A monotypic genus.

1. *S. natolicum* Fisch. and Mey. in Ind. Sem. hort. Petrop. IX (1843) 90; Benth. in DC. prodr. X, 248; Boiss. Fl. or. IV, 362; Grossh. Fl. Kavk. III, 368.—*lc.*: Mey. in Sert. Petrop. Dec. 2, II, tab. 6.—*Exs.*: Herb. Fl. Cauc. No. 189.

Biennial. Plant up to 80 cm tall. Stem rather thick, somewhat reddish, tomentose at base, glabrous above. Leaves grayish tomentose, densely stellate-pubescent; radical and lower cauline leaves crowded, yellowish, oblong-lanceolate, acute, 6–10 cm long, 1–1.5 cm broad, entire, narrowed into 3–6 cm long petiole, with prominent veins on lower surface; upper cauline leaves 1.5 cm long, 0.3 cm broad, lanceolate, projected, sessile, not decurrent, acute. Bracts ovate, acute, 4–5 mm long, 1.5 mm broad, mostly equaling pedicel, sparsely pubescent with white, short, glandular hairs. Flowers numerous. Pedicels 4 mm long, almost as long as calyx, mostly glabrous or sparsely puberulent; flowers in lax 15–50 cm long panicles, freely branched from base, branches virgate, projected, long. Calyx 5-partite, 3.5–4 mm long, lobes lanceolate-linear or linear, 3–3.5 mm long, acute, sparsely covered with short white unicellular, glandular (with small rounded gland at the end) hairs. Corolla 2 cm long, grayish yellow or orange-yellow, with purple spots at base, glabrous, tube 2 mm long, 2 mm across, limb subrotate 1.7–1.9 cm across, 5-partite, lobes unequal, entire, upper lobe reniform, 0.5–0.6 cm long, 1.2 cm broad, two lateral (lower) lobes rounded, 0.4–0.5 cm long, 0.6–0.7 cm broad, other lobes rounded—one 0.5 cm long and 0.5 cm broad, the other 2.5 mm long 4.5 mm broad. Stamens 4, fertile, filaments somewhat broad, dull reddish, bearded; anthers all equal, transverse, globose. Pistil with oblong ovary, 3 mm long, 1 mm broad; style 5–7 mm long; stigma entire. Capsule slender cylindrical, 1.2–2 cm long, 3–4 mm broad, obtuse, mucronate, glabrous, reddish brown, five times as long as calyx, almost 4-locular. Seeds numerous, 0.5 mm long, 0.2 mm broad, oblong, yellowish brown, pitted-rugose. May.

In the middle mountain zone, on dry slopes.—*Caucasus*: western Transcaucasia (outskirts of Batumi). *General distribution*: Balkan States—Asia Minor (Anatolia, Cappadocia), Armenia-Kurdistan. Described from Anatolia. Type in Leningrad.



Subfamily II. Antirrhinoideae Wettst. in Pflanzenfam. IV, 3b (1895) 49.—Subordo Antirrhinoideae Benth. in DC. Prodr. X (1846) 203, gen. pauc. excl.—Posterior corolla lobes slightly overlapping lateral lobes. At least lower leaves opposite. Posterior stamen absent or underdeveloped.

Tribe 1. ANTIRRHINEAE Duby, Bot. Gall. I (1828) 342; Chav. Monogr. Antirrhinées (1833) 73; Rothmaler in Fedde, Repert. LII, 1, 16.—Corolla tubular or campanulate, tube with sacciform umbo or spur. At least lower leaves opposite or whorled.

### Genus 1326. *CYMBALARIA*<sup>1, 2</sup> Medic.

Medic. Staatsw. Vorles. Churpf. Phys.-Oekon. Ges. I (1791) 230.

Flowers axillary. Corolla throat closed. Capsule globose, dehiscent by triradiate fissure. Seeds oblong, reticulate-rugose. Prostrate perennials with alternate, long-petiolate, cordate-reniform leaves, with lobed margin and palmate venation.

The genus includes 9 species, distributed in the Mediterranean Region and southern Europe.

1. *C. muralis* G.M. Sch. Fl. Wett. II (1800) 397.—*C. cymbalaria* (L.) Wettst. in Pflanzenfam. IV, 3 (1895) 58.—*C. hederacea* (Lam.) S.F. Gray, 176 Nat. Arr. Brit. Pl. II (1821) 322.—*Antirrhinum cymbalaria* L. Sp. pl. (1753) 612.—*L. cymbalaria* (L.) Mill. Gard. Dict. (1768) No. 8; Hegi, Illustr. Fl. Mittel-Eur. VI, 27; Schmalh. Fl. II, 263; Fedtsch. and Fler. Fl. Evrop. Röss. 849; Szaf., Kulcz. Pawl. Rosl. Polsk. 495.—*Antirrhinum hederaceum* Lam. Fl. Fr. II (1795) 338. *lc.*: Hegi, l.c. plate 235, f. 1.—*Exs.*: El. exs. austro-hung. No. 370.

Perennial. Plant glabrous, green. Stems 30–60 cm long, branching from base, matted. Leaves alternate, long-petiolate, cordate-reniform, 5-lobed. Flowers axillary. Calyx lobes acute, linear-lanceolate. Corolla pale violet, 5–8 mm long, with 2 yellow spots in throat, spur subobtusely curved, 2 mm long. Capsule globose, longer than calyx, dehiscent by triradiate fissure. Seeds oblong, reticulate-rugose. Flowering from June to July. Fruiting in September.

Naturalized, apparently, only in Central and Southern Europe. Cultivated as an ornamental plant.—*European USSR*: Baltic Region, Upper Dniester?, Crimea; *Caucasus*: western Transcaucasia (Abkhazia). *General distribution*: Southern and Central Europe, Mediterranean Region. Described from Central Europe. Type in London.

<sup>1</sup> Treatment by L.A. Kuprianova.

<sup>2</sup> From the Latin *cymba*—boat.

### Genus 1327. *KICKXIA*<sup>1, 2</sup> Dum.

Dum. Fl. belg. (1827) 35.—*Elatinoides* (Chav.) Wettst. in Pflanzenfam. IV, 3 (1895) 58.

Flowers axillary, on long slender pedicels. Corolla throat closed, lower lip longer than upper, with a spur. Capsule dehiscing on maturity by two opercula. Seeds reticulate-rugose. Annuals. Leaves hastate or orbicular, petiolate.

The genus includes about 25 species, distributed in Western Europe, the Mediterranean Region, Africa, Asia Minor and India.

1. Leaves oblong, hastate; calyx lobes linear-lanceolate ..... 2.
- + Leaves orbicular-reniform; calyx lobes lanceolate or broadly lanceolate ..... 1. *K. spuria* (L.) Dum.
2. Leaves with two auriculate teeth at base; plant sparsely pubescent ... 2. *K. elatine* (L.) Dum.
- + Leaves with several small teeth at base; plant densely lanate ..... 3. *K. caucasica* (Mussin) Kuprian.

1. *K. spuria* (L.) Dum. Fl. belg. (1827) 85.—*Linaria spuria* (L.) Mill. Gard. Dict. (1768) No. 15; Ldb. Fl. Ross. III, 204, quoad pl. taur.; Schmalh. Fl. II, 263 (Crimean plants).—*Antirrhinum spurium* L. Sp. pl. (1753) 613.

Perennial. Stems up to 55 cm long, branched, spreading, densely glandular and lanate (hairs numerous). Leaves alternate, short-petiolate, broadly ovate to orbicular, mucronate, 1–1.5 cm long and 1.5 cm broad. Flowers axillary, on long filiform pubescent pedicels. Calyx lobes ovate, generally long, tapering, 5–7 mm long, 2–3 mm broad, distinctly accrescent. Corolla 6–7 mm long (excluding spur), light yellow, lips subequal, upper lip bi-lobed, lobes dark lilac-colored inside, lower lip yellow, spur slender, curved. Capsule globose. Seeds 1 mm long, oblong-ovoid, reticulate-rugose. June.

On seashores. *European USSR*: Crimea. *General distribution*: western and eastern Mediterranean Region. Described from Western Europe. Type in London.

*Note*. In the USSR, this species is found only in eastern Crimea (Kerch peninsula, Feodosia, Planerskoe, Inkerman). Crimean plants are distinguished from Mediterranean plants, apparently, only by the denser pubescence of glandular, simple hairs. There are much bigger differences among the Crimean plants and the Mediterranean plants. Accordingly, Linnaeus' name should be retained for the Mediterranean plants. This

<sup>1</sup> Treatment by L. A. Kuprianova.

<sup>2</sup> Named after the Belgian botanist J. Kickx.

species was reported mistakenly from the Caucasus, but is absent in the herbaria.

2. *K. elatine* (L.) Dum. Fl. belg. (1827) 35; Hegi, Illustr. Fl. Mittel-Eur. VI, 28.—*Antirrhinum elatine* L. Sp. pl. (1753) 612. —*L. elatine* Mill. Gard. Dict. (1768) No. 16; Schmalh. Fl. II, 263 (western Ukraine) Szaf. Kulcz. Pawl. Rosl. Polsk. 495.—*Elatinoides elatine* (L.) Wettst. in Pflanzenfam. IV, 3b (1895) 58; Fedtsch. and Fler. Fl. Evrop. Ross. 749.—*lc.*: Hegi, VI, f. 16.—*Exs.*: HFAM, No. 155; Fl. pol. exs. No. 469.

Annual. Stems spreading, 10–30 cm long, branched from base; branches slender, sparsely hirsute. Leaves alternate, with 2–3 mm long petioles, lamina ovate-hastate; lower leaves with a pair of very distinct teeth; upper leaves sometimes without teeth; leaf apex slender, long-acuminate. Flowers axillary on long, filiform, glabrous pedicels. Calyx lobes lanceolate-linear, slender and long-acuminate, 3.5–4 mm long, 1 mm broad, sparsely pubescent. Corolla 5 mm long, yellowish white; lower lip deep yellow, longer than upper lip; upper lip bifid, lilac-colored inside; tube broad, straight; spur straight, slender tapering, 3.5 mm long. Capsule globose, dehiscent by 2 opercula. Seeds orbicular-ovoid, less than 1 mm long, sharply reticulate-rugose. July to September.

In fields.—*European USSR*: Upper Dniester; *Soviet Central Asia*: Syr Darya (Tashkent, introduced). *General distribution*: southern Scandinavia. Central Europe. Described from Central Europe. Type in London.

- 178 3. *K. caucasica* (Mussin) Kuprian. comb. nov.—*Linaria caucasica* Mussin in Spreng. Syst. veg. II (1825) 790.—*L. elatine* Ldb. Fl. Ross. III (1847–1849) 204; Boiss. Fl. or. IV, 376; Schmalh. Fl. II, 263 (regions in Crimea and Caucasia).—*Kickxia elatine* auct. non Dum.; Grossh. Fl. Kavk. III, 369; Kolak. Fl. Abkhaz. VI, 92.

Annual. Stems 10–40(50) cm tall, branched from base, erect or procumbent, rather densely lanate. Leaves alternate mucronate; petiole 2–5 mm long; lamina of lower leaves broadly ovate, with a few large teeth in addition to a pair of larger teeth at base. Both leaf surfaces rather densely covered with long multicellular hairs. Flowers axillary on long, filiform, pubescent pedicels. Calyx lobes linear-lanceolate, slender, long acuminate, densely villous, 5 mm long, 1 mm broad. Corolla 7 mm long, yellow; upper lip dark lilac-colored; spur straight, slender, pointed, 5 mm long. Capsule globose, 3–4 mm in diameter, dehiscent by 2 opercula. Seeds ovoid, more than 1 mm long, reticulate-rugose. July.

Along river banks. Common weed in gardens in coastal regions. *European USSR*: Crimea; *Caucasus*: all regions. Described from the Caucasus. Type not known.

*Note.* We could not see the specimens of *L. caucasica* collected by Mussin-Pushkin. However, the description of this species given by Sprengel shows that all our Caucasian and Crimean plants definitely belong to this species. Sprengel considers that Linnaeus described the Mediterranean plants (*Antirrhinum elatine*) and retains the Linnaean name for them. Our plants, clearly distinguishable from the plants of central Europe, are almost identical to those of southern Europe. Even on combining the central and southern European plants in one species, the priority name will still be that of Mussin, as published by Sprengel in 1825.

**Genus 1328. LINARIA<sup>1, 2</sup> Mill.**

Mill. Gard. Dict. (1768) No. 14.

179 Calyx 5-lobed. Corolla yellow, violet or brownish violet, bilabiate, upper lip bi-lobed, lower lip with a palate, spur generally long, curved, rarely short-conical. Capsule oblong or globose, glabrous, dehiscent by apical teeth. Seeds flat, discoid, reniform or trigonous, prismatic. Perennials or annuals, with alternate or whorled sessile leaves. Inflorescence paniculate, spicate or capitate.

The genus includes over 150 species distributed in the temperate zone, mainly in Eurasia. The species diversity in this genus is associated with mountainous terrain of the eastern and western Mediterranean Region.

*Economic importance:* Species of the genus *Linaria* have hardly any economic significance. P.S. Massagetov (1947), who studied nearly 29 species of figworts (Scrophulariaceae) from Soviet Central Asia, discovered a substantial quantity of alkaloids in the representatives of this family. He discovered most of the alkaloids in three species of toadflax (*Linaria*): *L. popovii* Kuprian., *L. sp.* and a little less in *L. bungei* Kuprian. L.M. Krechetovich (1940) notes the presence of traces of alkaloids with glucoside in *L. vulgaris* Mill., from which cyanic acid may be isolated. Apparently, this is the reason why *L. vulgaris* Mill. is not eaten by cattle. There are also some reports of poisoning of horses caused by this plant (see: *Yadovitye rasteniya* (Poisonous plants), (1940).

The use of toadflax flowers for extracting yellow dye is well known (Rollov, 1908).

Our common toadflax—*L. vulgaris* Mill.—is a weed which often infests flax and fodder grasses as well as other crops.

Some species of the genus *Linaria* are cultivated in gardens—*L. canadensis* (L.) Dum., *L. bipartita* (Vent.) Willd., *L. chalapensis* (L.) Mill.

<sup>1</sup> Treatment by L.A. Kupriyanova

<sup>2</sup> Name derived from the Latin *Linum*—flax; indicating the similarity of the leaves in many of its species to those of flax.



Some of our naturalized species are ornamental plants, for example, *L. transiliensis* Kuprian.; *L. schirvanica* Fom., *L. lenkoranica* Kuprian., *L. kopetdaghensis* Kuprian., and others may also be introduced in cultivation.

1. Perennials with mostly alternate leaves; corolla yellow, rarely violet or brownish violet ..... 2.
- + Annuals with whorled leaves, rarely alternate; corolla white, sky blue, or violet (yellow only in *L. simplex* DC. and *L. turcomanica* Kuprian.) ..... 49.
2. Seeds almost without a distinct border, flattened, reniform or acute trigonous; leaves alternate or whorled ..... 37.
- + Seeds orbicular, discoid, with broad, membranous border; leaves always alternate ..... 3.
3. Seeds discoid, sharply tuberculate in center; plants usually tall, densely leafy; leaves linear, broadly linear, ovate, flat, with prominent veins; corolla always yellow ..... 26.
- + Seeds discoid, smooth in center; plants slender, usually short; leaves filiform, linear, semicylindrical, veins obscure; rarely leaves broad, ovate; corolla generally yellow, lilac or violet, rarely yellowish brown ..... 4.
- 180 4. Calyx glandular-hairy, lobes slender, membranous along margin; corolla yellow or lilac with distinct blue stripes on tube; leaves linear-filiform, semicylindrical ..... 22.
- + Calyx glabrous, lobes fleshy; corolla yellow or violet; leaves linear-filiform, semicylindrical, rarely flat, lanceolate or ovate ..... 5.
5. Corolla yellow ..... 6.
- + Corolla violet or yellowish brown ..... 16.
6. Stem branched above; corolla 10–15 mm long; spur long, curved (7)9–12 mm long ..... 7.
- + Stem branched from base, branches patent; leaves linear, spreading, corolla 7–9(10) mm long, spur short, conical, straight, 5–7(8) mm long ..... 12.
7. Leaves flat, somewhat appressed to stem, lanceolate, up to 2 cm long and 1.5–2.5 cm broad; corolla 10–12 mm long (excluding spur); spur very slender, curved 9–10 mm long ..... 34. *L. leptoceras* Kuprian.
- + Leaves semicylindrical, linear or linear-filiform, spreading ..... 8.
8. Stem short, 15–20(30) cm, densely leafy in lower part, branched from base; corolla (8)9–10 mm long; spur 6–9 mm and pedicel 5–7 mm long ..... 27. *L. altaica* Fisch.
- + Stem rather tall, (20)30–55 cm, sparsely leafy; leaves distant; corolla 7–15 mm and pedicel 2–5 mm long ..... 9.

9. Flowers subsessile; corolla bright yellow, without spots in throat, 12–13 mm long; spur straight, short (5)8(10) mm long; upper corolla lip almost as long as lower, lobes of lower lip narrow. Pamirs. (Plate IX, fig. 2) ..... 20. *L. sessilis* Kuprian.
- + Flowers on 2–5 mm long pedicels; upper corolla lip much longer than lower, lobes of lower lip ovate ..... 10.
10. Calyx glabrous, lobes ovate, 2.5–3 mm long and 1.5–2 mm broad; corolla 15 mm long, without stripes, lateral lobes of lower lip broad, ovate, 3.5–4 mm broad; spur long, slender, 10–12 mm long; capsule globose, 5 mm in diameter. Balkhash sands ..... 35. *L. pedicellata* Kuprian.
- + Calyx glabrous or with minute glands, lobes linear or linear-lanceolate, 3–4 mm long; corolla 7–12 mm long, lateral lobes of lower lip oblong-ovate, 2–3 mm broad ..... 11.
- 181 11. Calyx short-glandular; corolla 7–12 mm long, yellow, with fine bluish veins; capsule globose or ellipsoid, 5–6 mm in diameter ..... 36. *L. striatella* Kuprian.
- + Calyx wholly glabrous; corolla 10–11 mm long, without distinct veins, light yellow, capsule globose, 4 mm in diameter ..... 33. *L. dolichoceras* Kuprian.
12. Pedicels 5–7 mm long ..... 13.
- + Pedicels 1.5–3 mm long ..... 14.
13. Leaves linear-filiform, semicylindrical; calyx lobes 1.5–2 mm long, 1 mm broad. On Irtysh sands ... 32. *L. brachyceras* (Bge.) Kuprian.
- + Leaves linear or linear-lanceolate, lower and middle leaves flat; calyx lobes 3.5 mm long. On Baltic sands ..... 31. *L. loeselii* Schweig.
14. Spur very short, straight, less than 5 mm long; corolla 6–8 mm long; capsule ellipsoid; stem branches erect. Plant common in sandy Transvolga and western Kazakhstan regions ..... 29. *L. odora* (M.B.) Fisch.
- + Spur 6–8 mm long ..... 15.
15. Stem branches divergent, lower branches procumbent; corolla 7–8 mm long, excluding spur; spur 6–6.5 mm long; capsule globose or globose-pyriform. On sands of the Dniester, Don and Donets ..... 30. *L. dulcis* Klok.
- + Stem branches usually all erect; corolla 8–9(10) mm long; spur (6)7–8 mm long; capsule oblong-ovoid. On sands of western Kazakhstan ..... 28. *L. dolichocarpa* Klok.
16. Corolla bluish violet or lilac-colored: upper lip distinctly longer than lower one; spur curved, (10)11–13 mm long; leaves linear, flat, often linear-filiform, ribbed ..... 17.

- + Corolla brownish violet or brownish lilac; upper and lower lips subequal; spur short, almost straight, 5–8(10) mm long; leaves flat, with prominent veins, linear, broadly linear, ovate-lanceolate or ovate 19.
- 17. Plant up to 40 cm tall, stem profusely branched, vegetative shoots absent; pedicels at anthesis short, 2–3 mm long; corolla 12–13 mm long (excluding spur), dark lilac-colored, with only a yellow patch in throat. On Balkhash sands ..... 26. *L. ramosa* (kar. and Kir.) Kuprian.
- + Plant 30–40(50) cm tall, stem generally simple, with vegetative shoots; pedicels 3–5 cm long; corolla bluish violet, with orange patch in throat; upper and lower lips dark colored, tube and spur pale violet. On rubbly mountain slopes ..... 18.
- 182 18. Stem 40–50 cm tall; corolla 13–15 mm long (excluding spur); spur 12–13 mm long; calyx glabrous ..... 25. *L. transiliensis* Kuprian.
- + Stem 30–35 cm tall; corolla 9–10 mm long (excluding spur); spur 11 mm long; calyx lobes glandular-hairy ... 24. *L. bungei* Kuprian.
- 19. Leaves linear, only lower leaves sometimes broadly lanceolate ..... 20.
- + All leaves broadly lanceolate or ovate, acuminate ..... 21.
- 20. Stem 15–20(40) cm long, branched from base; corolla brownish violet, with orange patch in throat, 13–15 mm long (excluding spur); spur 7–10 mm long ..... 23. *L. hepatica* Bge.
- + Stem 40–80 cm long, branched only in upper part; corolla with both lips yellowish brown (very rarely, completely yellow), 10–13 mm long; spur slightly curved, 5–6(8) mm long ..... 19. *L. popovii* Kuprian.
- 21. Lower leaves broadly lanceolate, upper lanceolate, 3–5 cm long and 0.7–1.5 cm broad; corolla 12–13 mm long (excluding spur) ..... 22. *L. kulabensis* B. Fedtsch.
- + Lower leaves ovate, upper narrowly lanceolate, 2–3.5 cm long and 0.5–1(2) cm broad; corolla 15 mm long (excluding spur) ..... 21. *L. kokanica* Rgl.
- 22. Corolla lilac-colored, 15–20 mm long (excluding spur); spur curved, 12 mm long and 1.5 mm broad at base; stem simple, 20–40 cm long; leaves linear, semicylindrical ..... 41. *L. schirvanica* Fom.
- + Corolla yellow, with blue veins ..... 23.
- 23. Plants small, with slender ascending stems; corolla 12–13 mm long, leaves linear-filiform, semicylindrical, corolla, if reaching 17 mm, then leaves flat, linear-lanceolate ..... 25.
- + Plants large, with stout stems; leaves always linear-filiform, semicylindrical; corolla 15–22 mm long ..... 24.

24. Stem 35–60 cm tall; inflorescence compact, long, all flowers normally developed; corolla large, 18–22 mm long (excluding spur); spur 12–16 mm long ..... 40. *L. macroua* (M.B.) Chav.  
 + Stem 25–30 cm tall; inflorescence lax, some flowers reduced; corolla 13–18 mm long (excluding spur); spur 15–20 mm long ..... 39. *L. incompleta* Kuprian.
25. Corolla small, 12–13 mm long (excluding spur); spur 12–16 mm long; stem ascending, rather densely leafy in lower part; leaves semicylindrical, linear-filiform ..... 38. *L. debilis* Kuprian.  
 + Corolla large, 17 mm long (excluding spur); spur 10–12 mm long; stems slender, ascending, numerous, branched; leaves flat, linear-lanceolate ..... 37. *L. meyeri* Kuprian.
- 183 26. Leaves large, ovate or broadly lanceolate; calyx distinctly zygomorphic, white-tomentose, lobes lanceolate, 7–10 mm long; corolla 22–27 mm long (excluding spur) ..... 27.  
 + Leaves linear-filiform, linear or linear-lanceolate; calyx nearly actinomorphic, glabrous, setaceous- or glandular-hairy, lobes linear-lanceolate, 2.5–6 mm long; corolla 8–15 mm long (excluding spur) ..... 28.
27. Leaves ovate, subamplexicaul, 4–5 cm long and 3 cm broad, corolla 22 mm long (excluding spur). Talysh ... 8. *L. lenkoranica* Kuprian.  
 + Leaves broadly lanceolate, 3.5–5(6) cm long and 0.7–1.5 cm broad; corolla 25–27 mm long (excluding spur). Kopet-Dag. (Plate VII, fig. 1) ..... 9. *L. kopetdaghensis* Kuprian.
28. Inflorescence paniculate; branches terminated by oblong or capitate racemes, forming corymbose inflorescence by late flowering stage; calyx glabrous, lanate or with sparse simple white hairs ..... 29.  
 + Inflorescence spicate, rarely paniculate; in latter case flowers rarely disposed along the entire length of branches; calyx glabrous; glandular or with simple white hairs ..... 31.
29. Lower leaves broadly lanceolate; calyx subglabrous, with sparse simple hairs; corolla yellow, veins absent, 8–11 mm long (excluding spur) ..... 10. *L. kurdica* Boiss. and Hoh.  
 + All leaves linear or linear-filiform; calyx densely lanate or wholly glabrous; corolla with violet veins, 8–10 mm long (excluding spur) ..... 30.
30. Calyx densely lanate, with short-acuminate teeth; leaves linear ..... 11. *L. lineolata* Boiss.  
 + Calyx entirely glabrous, teeth narrowly lanceolate, slender, long-acuminate; leaves linear-filiform ..... 42. *L. elymaitica* (Boiss.) Kuprian.



31. Stem with simple white hairs; calyx subglabrous or it with isolated simple hairs; corolla large (10)16 mm long (excluding spur), spur 8–10 mm long (Plate VII, fig. 5) ..... 13. *L. biebersteinii* Bess.  
 + Stem wholly glabrous or glandular-hairy above; calyx glabrous or glandular-hairy ..... 32.
32. Plant glabrous throughout or stems very sparsely hairy ..... 33.  
 + Plant with inflorescence axis and pedicels glandular-pubescent..... 36.
- 184 33. Stem erect, branched above; leaves rigid, lanceolate-linear; inflorescence paniculate; calyx wholly glabrous outside, papillose-hairy inside; corolla 9–12 mm long (excluding spur); spur slender, 5.5–7 mm long and 1 mm broad at base; capsule oblong-globose, 6–7 mm long and 5–6 mm broad (Plate VII, fig. 3) ..... 14. *L. ruthenica* Blonski.  
 + Plant different in appearance; calyx glabrous inside; corolla 12–16 mm long (excluding spur); spur 8–12 mm long ..... 34.
34. Inflorescence compact, spicate, up to 12 cm long, many-flowered; corolla large, 13–15 mm long (excluding spur); spur 10–12 mm long; calyx lobes with narrow, white, scarious margin; capsule small, globose, 4–5 mm long ..... 15. *L. schelkovnikovii* Schischk.  
 + Inflorescence rather lax; capsule oblong-globose, 8–9 mm long ..... 35.
35. Leaves somewhat broad, lanceolate-linear, slightly broadened above, 3–5 cm long and 0.5–1.5 cm broad; inflorescence many-flowered; calyx lobes broad, 3 mm long and 2–2.5 mm broad; corolla 12–16 mm long (excluding spur); sinus on upper lip 2 mm deep; spur curved, 11–14 mm long ..... 17. *L. acutiloba* Fisch.  
 + Leaves linear-lanceolate, slender long-acuminate, 3–6 mm long and up to 0.5 cm broad; inflorescence few-flowered; calyx lobes narrow, 3 mm long and 15 [sic] mm broad; corolla 13–15 mm long (excluding spur); sinus on upper lip 3 mm deep; spur 8–10 mm long ..... 18. *L. melampyroides* Kuprian.
36. Stem (30)40–90 cm; leaves linear, flat; inflorescence axis sparsely glandular-hairy; calyx lobes 3–4 mm long and 2 mm broad; corolla 15–18 mm long (excluding spur); capsule oblong, 9–10 mm long and 6–7 mm in diameter (Plate VII, fig. 4) ..... 16. *L. vulgaris* Mill.  
 + Stem 10–20 cm, densely leafy; leaves filiform-linear, semicylindrical, rarely flat; inflorescence axis, pedicels and calyx densely villous and glandular-hairy; calyx lobes narrowly linear, 5–6 mm long and 1.5 mm broad; capsule globose, 6 mm in diameter .. 12. *L. buriatica* Turcz.
37. Seeds oblong, compressed reniform, with very narrow and thin border, tuberculate-rugose; plants small, with numerous axillary branches, stems ascending or decumbent; lower and middle leaves in whorls

- of 3-4, upper leaves alternate, orbicular-ovate or lanceolate-linear; corolla 6-8 mm long ..... 38.
- + Seeds sharply trigonous or elliptical, with thickened outer margin; leaves alternate, rarely whorled ..... 40.
- 185 38. Stem 10-20 cm, branched from base, branching especially profuse in middle and upper parts; branches slender, long, axillary; cauline leaves sessile, opposite or in whorls of three, ramal, usually opposite or alternate, lower leaves lanceolate, 8-10 mm long, 4-5 mm broad, upper leaves oblong-lanceolate. (Plate VIII, fig. 5) ..... 52. *L. creticola* Kuprian.
- + Plants larger; leaves orbicular-reniform, amplexicaul ..... 39.
39. Stem 12-25 cm, with short axillary branches only in upper part; leaves orbicular-ovate, acute, amplexicaul 10 mm long and broad, upper leaves and floral leaves orbicular-reniform, short-acuminate; corolla 7 mm long (excluding spur); spur 5 mm long ..... 51. *L. cretacea* Fisch.
- + Stem 20-30 cm, lower leaves orbicular-reniform, amplexicaul, 20 mm long and 20 mm broad, upper leaves and bracts orbicular-reniform, short-acuminate; corolla 5-6 mm long (excluding spur); spur 3 mm long ..... 53. *L. macrophylla* Kuprian.
40. Leaves whorled ..... 41.
- + Leaves alternate ..... 42.
41. Leaves ovate or oblong-ovate; inflorescence short, 3-5-flowered; corolla 12-17 mm long (excluding spur); yellow; spur short, conical, 3.5-6 mm long ..... 50. *L. japonica* Mil.
- + Leaves linear, acuminate; inflorescence long; corolla 7-10 mm long (excluding spur), sky blue; spur short, straight, 2 mm long ..... 48. *L. monspessulana* (L.) Mill.
42. Calyx longer than capsule; corolla large, 18-38 mm long ..... 43.
- + Calyx as long as capsule or shorter; corolla small, 8-12 mm long ..... 44.
43. Leaves ovate-lanceolate, upper lanceolate; calyx lobes broad-lanceolate, 7-12 mm long and 3-4 mm broad; corolla 25-35 mm long (excluding spur); spur broad, curved, 15-22 mm long ..... 1. *L. grandiflora* Desf.
- + Leaves linear-lanceolate or narrowly lanceolate; calyx lobes lanceolate, slender, acuminate, 5-6 mm long and 2 mm broad; corolla 18-20 mm long (excluding spur); spur 13-15 mm long ..... 2. *L. zangezura* Grossh.
44. Corolla grayish violet; leaves semicylindrical; spur straight, very short, 2-2.5 mm long ..... 47. *L. corifolia* Desf.
- + Corolla yellow, leaves flat; spur longer ..... 45.

- 186 45. Stem 15–30 cm, ascending or procumbent, branches spreading; leaves oblong-ovate, 6–14 mm long and 2.5–7 mm broad; corolla 8–9(10) mm (excluding spur); spur 5–6.5 mm long. Maritime Crimean sands ..... 5. *L. sabulosa* Czern.  
 + Stem 30–100 cm; leaves lanceolate, linear-lanceolate or linear ..... 46.
46. Lower cauline leaves broadly ovate, acuminate, upper leaves lanceolate; corolla 11–12 mm long (excluding spur); spur 7–10 mm long; capsule globose, 5–6 mm in diameter (Plate VIII, fig. 2) ..... 3. *L. genistifolia* (L.) Mill.  
 + Lower leaves narrower; corolla 8–10 mm long; capsule 4–5 mm in diameter ..... 47.
47. Stem erect, branched above; lower leaves amplexicaul, oblong-lanceolate, erect, inflorescence long, many-flowered (Plate VIII, fig. 1) ..... 4. *L. pontica* Kuprian.  
 + Stem ascending or procumbent; often branched from base; leaves linear lanceolate, linear-filiform or linear; inflorescence short, about 3–5(8) flowered ..... 48.
48. Leaves linear-filiform, 20–40 mm long and 2–3 mm broad. Kerch, shale ..... 6. *L. euxina* Velen.  
 + Leaves linear-lanceolate, 20–30 mm long and 3–4 mm broad. Caucasia, Crimea (Kuchuk-Lambat), rubbly slopes (Plate VIII, fig. 3) .... 7. *L. sypsiensis* C. Koch.
49. All or lower leaves whorled ..... 50.  
 + All leaves alternate ..... 57.
50. Flowers axillary or in rather long racemes. Plants cultivated .... 57.  
 + Flowers in capitate inflorescence, elongated in fruit; corolla 4–5 mm long; spur straight, shorter than corolla, 1.5–3.5 mm long. Plants growing wild ..... 53.
51. Flowers axillary; pedicels long; corolla white, with bright orange patch in throat, 10–11 mm long (excluding spur); spur 12 mm long. Cultivated ..... 49. *L. reflexa* (L.) Desf.  
 + Flowers in racemes. Corolla violet or lilac-colored ..... 52.
52. Pedicels long, 2–3 times as long as bracts; corolla violet, with orange patch in throat, 12 mm long (excluding spur) ..... 46. *L. bipartita* (Vent.) Willd.  
 + Pedicels short; corolla lilac-colored, white in the throat ..... 45. *L. canadensis* (L.) Dum.
53. Seeds oblong, trigonous; calyx, bracts and inflorescence axis glabrous; corolla white, upper lip much longer than lower; capsule oblong ... 59. *L. albifrons* (Sibth. and Sm.) Spreng.
- 187 + Seeds orbicular, flat, with broad membranous margin; calyx, bracts and inflorescence axis glandular-hairy ..... 54.

54. Corolla pale sky blue ..... 55.  
 + Corolla yellow ..... 56.  
 55. Leaves lanceolate, 1–1.5 cm long and 3–4 mm broad; stems always simple; inflorescence capitate, elongated in fruit .....  
 ..... 57. *L. micrantha* (Cav.) Hoffmg. and Link.  
 + Leaves linear, 1.5–3.5 cm long and 1–2 mm broad, stem almost always branched; inflorescence much elongated in fruit .....  
 ..... 54. *L. arvensis* (L.) Desf.  
 56. Stem branched, corolla 4 mm long (excluding spur); seeds smooth in center ..... 55. *L. turcomanica* Kuprian.  
 + Stem simple; corolla 5 mm long (excluding spur); seeds sharply tuberculate in center ..... 56. *L. simplex* (Willd.) DC.  
 57. Corolla white, 7 mm long, (excluding spur); spur 5–7 mm long, 1 mm broad; calyx lobes long, patent, 5–7 mm long, 1 mm broad .....  
 ..... 43. *L. chalepensis* (L.) Mill.  
 + Corolla sky-blue, 8 mm long (excluding spur); spur 12–14 mm long; calyx lobes not patent, 3 mm long ..... 44. *L. armeniaca* Chav.

Section 1. *Speciosae* (Benth.) Wettst. in Pflanzenfam. IV, 3 (1895) 59; Benth. in DC. Prodr. X, 274.—Perennials. Seeds elongated trigonous, margins rugose. Corolla yellow, (8)10–35 mm long (excluding spur). Leaves alternate. Mountain xerophytes. Most species of this section are distributed in the eastern Mediterranean Region.

Series 1. *Dalmaticae* Klok. in mss.—Leaves large, lanceolate to ovate-lanceolate. Corolla 11–35 mm long. Inflorescence long, lax, paniculate. Plant of rubbly mountain slopes and sandy regions.

1. *L. grandiflora* Desf. in Ann. Mus. Par. X, 1 (1808) 51; Choix de Pl. ex Coroll. Tourn. 21, 30.—*L. dalmatica* Ldb. Fl. Ross. III (1847–1849) 290, non Mill.—*L. dalmatica* Mill.  $\beta$ . *grandiflora* Boiss. Fl. or. IV (1879) 376; Grossh. Fl. Kavk. III, 372. —*Exs.*: Pl. or. Exs. No. 68.

Perennial. Plant glabrous, bluish gray. Stems 25–75 cm tall, few, rarely solitary, erect, simple or branched above. Leaves sessile, erect, lower leaves ovate-lanceolate, amplexicaul, upper leaves lanceolate, acuminate 2(4) cm long, 0.5–1.5 cm broad, 3-veined. Flowers in simple, rarely paniculate inflorescences. Bracts broadly lanceolate, long-acuminate, about 1 cm long, 0.5 cm broad. Pedicels 1.3 mm long. Calyx glabrous; lobes broad, lanceolate, slender, long-acuminate, 7–10(12) mm long, 3–4 mm broad. Corolla bright yellow, 25–30(35) mm long (excluding spur); spur 15–20(22) mm long, straight, slender, long-tapering; upper lip deeply (6–7 mm) 2-lobed, lobes subobtusate, lower lip with broadly ovate lobes, sometimes with a blurred orange patch in throat. Capsule slightly oblong,



calyx teeth longer than capsule. Seeds trigonous, about 1 mm long, reticulate-rugose. July to August.

On rubbly slopes.—*Caucasus*: southern and eastern Transcaucasia, Talysh. *General distribution*: Asia Minor (east). Described from eastern Anatolia from Tournefort's specimens. Type in Paris.

*Note.* *L. calycina* Boiss. and Bal. is most closely related to *L. grandiflora* Desf. from which it is distinguished by broader and larger amplexicaul leaves and calyx lobes much longer than the capsule. *L. calycina* Boiss. is not found in the USSR in the Caucasus, although some authors have reportedly referred to this species.

2. *L. zangezura* Grossh. in Zhurn. Russk. Bot. obsch. XIV, 3 (1929, 1930) 313.—*L. dalmatica* var. *stenophylla* Bordz. in Byull. Kievsk. bot. sada XII–XIII (1931) 137; Grossh. Fl. Kavk. III, 372.

Perennial. Plant bluish gray. Stems branched, 40–80 cm tall, often flexuous. Leaves narrowly lanceolate or linear, pointed, narrowed toward base, 3.5 cm long, 2.5 mm broad, single-veined. Inflorescence lax, branched, few-flowered. Bracts lanceolate, acuminate, 8–10 mm long. Pedicels 1.5–2 mm long. Calyx lobes narrow, lanceolate, slender, acuminate, 5–6 mm long and 2 mm broad. Corolla bright yellow, 18 mm long (excluding spur); spur 13–15 mm long, straight, slender, pointed; upper lip deeply bilobed, with subobtusate lobes, lower lip with ovate lobes. Capsule oblong-globose, calyx teeth slightly longer than capsule. Seeds trigonous. July to August.

In the central mountain zone on rubbly slopes.—*Caucasus*: southern Transcaucasia. Endemic. Described from Zangezur. Type in Tbilisi.

*Note.* This species is morphologically closest to *L. dalmatica* Mill., but is distinguished by narrower leaves and a smaller corolla. Grossheim, differentiating his species from *L. dalmatica* Mill., mentions that while *L. zangezura* is an annual plant, *L. dalmatica* is a perennial. This, however, is doubtful.

3. *L. genistifolia* (L.) Mill. Gard. Dict. (1768) No. 14; Ldb. Fl. Ross. III, 209; Schmalh. Fl. II, 264; Hegi, Illustr. Fl. Mittel-Eur. VI, 26; Pavlov. Fl. tsentr. Kazakhst. III, 134; Maevsk. Fl. 640; Kuprian. in Tr. Bot. inst. Akad. Nauk SSSR, I, 9, 41.—*L. chloraefolia* Rchb. Ic. pl. crit. V, tab. 436 (1821) 21.—*Antirrhinum genistifolium* L. Sp. pl. (1753) 616.—*A. genistifolium* M.B. Fl. taur.-cauc. II (1808) 75.

189 Perennial. Plant glabrous, bluish gray, (30)80–100 cm tall; stems single or 2–5, with a few vegetative shoots at base, branched above; lower leaves broadly ovate to ovate, upper lanceolate, long-pointed, fleshy, distinctly 3-veined. Inflorescence paniculate, lax, long, 10–15-flowered. Pedicels 3–6 mm long, equaling or exceeding bracts. Calyx lobes

lanceolate, slender, pointed, 6–6 mm long. Corolla light yellow, 11–12 mm long (excluding spur), corolla tube broad, lobes of upper lip pointed, lower lip whitish yellow-pubescent in throat, lobes ovate, 4 mm broad; spur slightly curved, 7–12 mm long. Capsule globose, 5–6 mm in diameter, equaling or slightly exceeding calyx. Seeds trigonous, with narrow fringe at angles, flat surface reticulate-rugose. July. (Plate VIII, fig. 2.)

Plant fairly common in sandy regions and forests. *European USSR*: Upper Dnieper, Middle Dnieper, Volga-Don, Trans-Volga Region, Upper Dniester, Bessarabia, Black Sea Region, Lower Don, Lower Volga; *Western Siberia*: Upper Tobol, Irtysh, Altai. *Soviet Central Asia*: Aral-Caspian Region (northern section). *General distribution*: Central Europe. Described on the basis of Gmelin's materials from Siberia. Type in London.

This series also includes *L. dalmatica* Mill., not found in the Soviet Union.

We see a natural connection of *L. genistifolia* (L.) Mill. with species of this series and not with *L. cretacea* Fisch., as suggested by M.V. Klovov (1947) and M.G. Popov. (1922).

Series 2. *Ponticae* Kuprian.—Stem branched above or only in inflorescence. Leaves lanceolate or oblong-lanceolate. Corolla 8–10 mm long; inflorescence lax, long, paniculate. Plants common on rubbly slopes of the lower zone of the Caucasus and Crimean coquina sands.

4. *L. pontica* Kuprian. in Tr. Bot. inst. Akad. Nauk SSSR, I, 9 (1950) 64; Kolak. Fl. Abkhaz. IV, 93, nomen.—*L. genistifolia* Boiss. Fl. or. IV (1879) 377, non L.; Grossh. Fl. Kavk. III, 373.—*L. scenoreina* Juz. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XIV (1951) 30.—*L. imerethica* Kem.-Nath, in Fl. Gruz. VII (1952) 503, fig. 338.—*L. iberica* Kem.-Nath. l.c. 504, fig. 339.—*L. kantschavelii* Kem.-Nath. l.c. 504, fig. 340.—? *L. caucasica* Kem.-Nath. l.c. 509.—*Antirrhinum genistaefolium* M.B. Fl. taur.-cauc. II (1808) 74.

Perennial. Plant bluish gray. Stem 40–80 cm tall, erect, solitary or 3–4, branched above. Leaves sessile, alternate, oblong-lanceolate, somewhat fleshy, with slightly prominent midrib, 2.5–3.5 cm long, 0.5–1(1.5) cm broad; long-acuminate. Inflorescence usually paniculate. Flowers in inflorescence 1 cm apart in lower part 0.5 cm apart above. Bracts lanceolate, long-pointed, 4.5 mm long,  $1\frac{1}{2}$ –2 times as long as pedicels. 190 Pedicels 2–2.5(3) mm long. Calyx lobes narrowly lanceolate, acuminate, 3–3.5 mm long, 1–1.5 mm broad. Corolla light yellow, veins not visible, 8–10(11) mm long (excluding spur); spur 5–6(7) mm long, slender, slightly curved; upper corolla lip shallowly bifid, lobes subobtusate, lateral lobes of lower lip ovate. Capsule globose, 4–5 mm long, calyx teeth not longer than capsule. Seeds trigonous, with very narrow fringe at angles, reticulate-rugose. June (Plate VIII, fig. 1).

On rocky slopes, rarely on sands.—*European USSR*: Crimea; *Caucasus*: Ciscaucasia, western and eastern Transcaucasia, Talysh, rarely in southern Transcaucasia. Endemic. Described from Crimea. Type in Leningrad.

*Note*. The Crimean-Caucasian species *L. pontica* Kuprian. is usually identified with *L. genistifolia* (L.) Mill., in spite of the fact that it is well distinguished from the latter. Genetically, *L. pontica* Kuprian. is closer to *L. monochroma* Boiss. and *L. praedita* Boiss. from Asia Minor.

5. *L. sabulosa* Czern. ex Klovov in Bot. zhurn. SSSR, XXXIV (1949) 69; Kuprian. in Tr. Bot. inst. Akad. Nauk SSSR, I, 9, 42.

Perennial. Plant entirely glabrous, bluish gray, 15–30 cm tall. Stems ascending or procumbent; densely leafy; branched above, with numerous patent branches. Leaves ovate or oblong-lanceolate, 6–14 mm long and 2.5–7 mm broad, sessile, subamplexicaul, alternate, fleshy, veins obscure. Bracts ovate-lanceolate, long pointed, longer than pedicels. Pedicels 1.2–2 mm long. Calyx lobes oblong-lanceolate, 1.5–3(3.5) mm long and 1.2–1.5 mm broad. Corolla yellow, veins not visible, 8–9(10) mm long (excluding spur); spur straight or slightly curved, 5–6.5 mm long, lobes of both corolla lips obtuse, orbicular. Capsule globose. Seeds 1 mm long, trigonous, coarsely rugose, with very narrow fringe at 3 edges.

On coastal sands.—*European USSR*: Crimea (Eupatoria Region). Endemic. Described from Crimea. Type in Kiev.

Series 3. *Linifoliae* Kuprian.—Stems branched from base. Leaves linear or linear-filiform. Corolla 8–10 mm long. Flowers terminating branches in short, 3–5(8)-flowered inflorescence. Plant common on stony slopes of lower mountain zone and sands.

6. *L. euxina* Velen. in Bot. Centralbl. XXXVI (1888) 125; Fl. Bulg. 425; Stoyanov and Stefanov, Fl. Bolg. 1006; Hayek, Prodr. Fl. 193 Balk. II, 138; Kuprian. in Tr. Bot. inst. Akad. Nauk SSSR, I, 9, 42.

Perennial. Plant green, 30–50 cm tall. Stems numerous or solitary, procumbent, profusely branched almost from base, branches long, divergent, densely leafy. Leaves sessile, flat, linear; lower cauline leaves lanceolate-linear, 2–4 mm long, 2–3 mm [cm] broad, narrowed toward base, slender-acuminate, midrib obscure. Flowers in lax 3–5(8)-flowered raceme. Pedicels 1–2 mm long. Bracts longer than pedicels. Calyx lobes lanceolate, slender-acuminate, 3–4 mm long. Corolla light yellow, 9–10 mm long, excluding spur; spur slightly curved, 5–6 mm long, lobes of upper lip orbicular, lower lip yellow-pubescent in throat, with rounded lobes. Capsule orbicular, 4 mm in diameter. Seeds trigonous. August.



In sandy regions.—*European USSR*: Crimea (Kerch Peninsula). *General distribution*: Balkan States-Asia Minor. Described from Varna. Type in Prague.

7. *L. syspirensis* C. Koch in Linnaea, XXIII (1849) 717; Grossh. Opred. rast. Kavk. 306; Kuprian. in Tr. Bot. inst. Akad. Nauk SSSR, I, 9, 42. —*L. petraea* Stev. in Bull. Soc. Nat. Mosc. XXX (1857) 437. —*L. steveni* Nym. Suppl. syll. Fl. Europ. (1865) 22.—? *L. adzarica* Kem.-Nath. in Fl. Gruz. VII (1952) 509, fig. 341.

Perennial. Plant bluish gray, 20–40 cm tall. Stems numerous, rarely solitary, profusely branched from base, branches divergent. Leaves flat, lanceolate-linear or linear, acuminate, 2–3.5 cm long and 3–4 mm broad; lower cauline leaves up to 5 mm broad. Flowers in lax, few-flowered panicles with 3–8 flowers. Pedicels 1–2 mm long. Bracts longer than pedicels. Calyx lobes lanceolate, 2.5–3 mm long slender pointed. Corolla light yellow, 9–10 mm long, excluding spur; spur slightly curved, 5–6 mm long; lobes of upper lip triangular, lower lip bright yellow, with narrow 2.5–3 mm broad lobes. Capsule globose, 4 mm in diameter. Seeds trigonous with rugose angles. June to August (Plate VIII, fig. 3).

Rocky slopes of lower mountain belt, rare.—*European USSR*: Crimea (southern coast); *Caucasus*: western Transcaucasia. Endemic. Described from western Transcaucasia. Type in Berlin.

*Note*. Crimean plants are very similar to Caucasian plants, differing only slightly in leaf form and by the most insignificant deviation in corolla size. We, therefore, think they should be combined. This series also includes *L. linifolia*, described by Linnaeus from northern Italy.

Section 2. *Grandes* (Benth.) Wettst. in Pflanzenfam. IV, 3 (1895) 59; Benth. in DC. Prodr. X, 271.—Perennials. Seeds discoid, smooth or tuberculate. Corolla yellow or lilac-colored. Leaves alternate.

Subsection 1. *Tuberculatae* Kuprian.—Seeds discoid, tuberculate, with broad membranous margin.

Series 4. *Pyramidatae* Kuprian.—Plants large, with compact spicate inflorescence. Calyx white-tomentose. Corolla 22–27 mm long (excluding spur). Plants common on mountain slopes of Talysh and Kopet-Dag. This series includes *L. pyramidata* (Lam.) Spreng., growing in eastern Anatolia.

8. *L. lenkoranica* Kuprian. in Tr. Bot. inst. Akad. Nauk SSSR, I, 9 (1950) 67.—*L. pyramidata* Ldb. Fl. Ross. III (1847–1849) 205, non Lam.: Boiss. Fl. or. IV, 370; Grossh. Fl. Kavk. III, 37.—*lc.*: Kuprian. *lc.* Plate I.

Perennial. Plant bluish gray, glabrous. Stem erect, 30–40 cm tall, densely leafy, simple or branched in inflorescence. Leaves erect, large, ovate, acuminate, subamplexicaul, 4–5 cm long and 3 cm broad, 5-veined,



191



upper leaves narrower. Flowers in dense pyramidal inflorescences, sometimes branched. Pedicels short, 2–3 mm long. Bracts lanceolate, longer than pedicels. Calyx zygomorphic, white-tomentose; lobes broad-lanceolate, almost ovate, 7 mm long, 3 mm broad, one lobe lanceolate-linear, 7 mm long, 2 mm broad. Corolla bright yellow, 22 mm long (excluding spur); upper lip curved and rigid with 2.5–3 mm deep sinus, lower lip almost equaling upper lip, with narrow lobes, 2.5–3 mm broad; spur 10–12 mm long, slender. Capsule glabrous, 7 mm in diameter. Seeds discoid, with membranous margin, tuberculate in center, 3 mm long, 2 mm broad. July (Plate VII, fig. 2).

Mountain slopes.—*Caucasus*: Talysh. *General distribution*: Iran (Karadag). Described from Talysh. Type in Leningrad.

9. *L. kopetdaghensis* Kuprian. in Tr. Bot. inst. Akad. Nauk SSSR, I, 9 (1950) 66.—*L. pyramidata* O. and B. Fedtsch. Perech. rast. Turkest. 5 (1913) 81, non Chav.—*lc.*: Kuprian l.c. Plate I.—*Exs.*: Sint. Pl. transcasp.-pers. 1900–1901, No. 803.

Perennial. Plant bluish gray, glabrous. Stem erect, 30–55 cm tall, simple or branched above. Leaves erect, large, broadly lanceolate, with one or three veins, 3–5(6) cm long, 0.5–1.5 cm broad, upper leaves narrower, lanceolate. Flowers in dense pyramidal inflorescence. Pedicels 2–3 mm long. Bracts lanceolate, longer than pedicels. Calyx zygomorphic, white-tomentose, lobes lanceolate; gradually tapering, (8)9–10 mm long, 2.5 mm broad, one of them linear-lanceolate, 9–10 mm long, 2 mm broad. Corolla  
195 bright yellow, 25–27 mm long (excluding spur); upper lip curved, with rigid lobes and 3–4 mm deep sinus at apex; lower lip almost as long as the upper, with 2.5–3 mm broad lobes; spur 12–15 mm long. Capsule usually enclosed by accrescent calyx lobes, 7 mm in diameter. Seeds discoid, with membranous margin, tuberculate in center, 3 mm long and 2 mm broad. May–June–July (Plate VII, fig. 1.)

On mountain slopes in steppe at altitudes of 1500–2600 m and among dryland crops. *Soviet Central Asia*: mountainous Turkmenia. Endemic. Described from Kopet-Dag. Type in Leningrad.

*Note*. Closely similar to *L. lenkoranica* Kuprian. from which it is distinguished by narrower leaves and a slightly larger corolla. Within the USSR, it is found, apparently, only in Khorasan.

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Plate VII.

1. *Linaria kopetdaghensis* Kuprian., general appearance, flower;—2. *L. lenkoranica* Kuprian., portion of stem;—3. *L. ruthenica* Blonski, upper portion of stem, flower, calyx;—4. *L. vulgaris* Mill. (s. str.); upper portion of stem, flower with portion of inflorescence axis;—5. *L. biebersteinii* Bess. (s. str.), general appearance, flowers and portion of inflorescence axis and seed.

Series 5. *Kurdicae* Kuprian.—Inflorescence densely paniculate, terminal on branches. Calyx sparsely hairy. Corolla 8–10(11) mm long. Plant common in subalpine and alpine grasslands.

10. *L. kurdica* Boiss. and Hoh. in Boiss. Diagn. pl. or. I, 4 (1844) 73; Fl. or. IV, 371; Grossh. Fl. Kavk. III, 371.—*L. kurdica* var. *hajastanica* Bordz. in Vestn. Tifl. bot. sada nov. ser. 5 (1927) 60.

Perennial. Plant bluish gray. Stems 30–50 cm tall, erect, usually branched only in upper part. Leaves alternate, lanceolate, fleshy, with three prominent veins, 3–6 cm long, 1–1.5 cm broad, rounded base, gradually narrowed above. Flowers in paniculate inflorescences, crowded at tips of branches. Bracts narrowly lanceolate, longer than pedicels, 1–1.5 mm long. Calyx lobes lanceolate-linear, acuminate, 3 mm long and 1 mm broad, glabrous or with sparse simple hairs. Corolla light yellow, with orange patch in throat, 8–11 mm long (excluding spur); upper lip slightly longer than lower, sinuate; lower lip with rounded, ovate lobes; spur 6–7 mm long, slender, slightly tapering. Capsule globose. Seeds discoid, oblong, with narrow membranous margin, tuberculate in center, 3 mm long, 2 mm broad. August.

Subalpine grasslands. *Caucasus*: southern Transcaucasia. *General distribution*: Armenia, Kurdistan. Described from Kurdistan. Type in Geneva.

11. *L. lineolata* Boiss. in Kotschy, Pl. exs. 1846; Boiss. Diagn. pl. or. I, 12, 42; Fl. or. IV, 379; Grossh. Fl. Kavk. III, 372.

Perennial. Stem erect with ascending base, 40–55 cm tall, branched, especially in upper part. Leaves linear, fleshy, 3.5–4 cm long and 0.3(0.5) cm broad. Inflorescence paniculate, racemes short, rather dense, about 12 cm long, almost capitate on lateral branches. Bracts linear, as  
196 long as pedicels or a little shorter. Pedicels 1.5–2 mm long, elongated in fruit. Calyx lobes slender, with scarious margin, linear-lanceolate, densely lanate, 2.5 mm long and 1 mm broad. Corolla yellow with violet veins, 10 mm long (excluding spur); spur slender, slightly curved, 7 mm long; upper lip bifid, lobes subobtus, lower lip with narrow lateral lobes and orange patch in throat. Capsule globose, longer than calyx teeth. Seeds discoid, shiny, with broadly membranous margin, 2.5 mm, finely tuberculate. August.

In the central mountain zone, on grassy slopes.—*Caucasus*: southern Transcaucasia, Talysh. *General distribution*: eastern Anatolia, Armenia-Kurdistan. Described from Elbrus. Type in Geneva.

*Note*. The material from Lenkoran available to us differs slightly from the plants collected from Ararat. The former have broader leaves.

Series 6. *Buriaticae* Kuprian.—Stems 10–20 cm tall. Leaves linear. Inflorescence axis, pedicels and calyx covered with multicellular simple



and glandular hairs. Plant common on stony and steppe mountain slopes of Trans-Baikal Region.

12. *L. buriatica* Turcz. Cat. Baikal. (1837) 14 and 862 (nomen); Bull. Soc. Nat. Mosc. XXIV, 302; Ldb. Fl. Ross. III, 211; Kuprian. in Sov. bot. (1936) No. 4, 117.—*Exs.*: GRF, No. 3470.

Perennial. Stems branched or simple, ascending, 10–20 cm tall, densely leafy. Leaves filiform-linear, semicylindrical, ribbed or flat, somewhat broader, with one prominent rib, slender long pointed 2–4.5(6) cm long and 1–3 mm broad. Flowers in dense terminal 3–7 cm long spikes; inflorescence axis, as well as pedicels and calyx densely glandular-pubescent. Bracts linear-lanceolate, 2.5–3 mm long. Pedicels short, 1.5–2(3) mm long. Calyx densely glandular-hairy outside, with narrow, linear-lanceolate, 5–6 mm long and 1–1.5 mm broad, acuminate lobes, pubescent inside. Corolla yellow, with bright orange patch in the throat, (excluding spur) 15–16 mm long, lower lip with large rounded 2–5 mm broad lobes, middle lobe slightly narrower, 3–4 mm broad; upper lip much longer than lower, with 2 mm deep sinus: spur curved, 12–15 mm long. Capsule globose, 6 mm in diameter. Seeds discoid, with broad membranous margin, 1.5–2 mm in diameter, tuberculate in center. June to July.

In stony steppe and sandy regions.—*Eastern Siberia*: Angara-Sayan, Dauria. *General distribution*: northern Mongolia. Described from Olkhon Island. Type in Leningrad.

Series 7. *Biebersteinianae* Klok. in Bot. zhurn. SSSR, XXXIV, 1 (1949) 75.—Stems glabrous or pubescent, usually densely so below, with  
197 eglandular multicellular hairs. Calyx glabrous or pubescent outside, always pubescent inside. Plant common in steppes, on steppe slopes and alpine grasslands.

This series also includes the southern European species *L. italica* Trev., which is not represented in our flora. The reference of S.S. Stankov (1949) to the discovery of *L. italica* Trev. in USSR near Saratov is doubtful. *L. italica* Trev. is found only in the European Alps. M.I. Kotov collected from the Izmail Region (in a park) a *Linaria* specimen similar to *L. italica* Trev. and named it *L. bessarabica* Kotov. [Bot. zhurn. Akad. Nauk SSSR, XI, 4 (1954) 78].

13. *L. biebersteinii* Bess. Enum. pl. Volh. (1822) 25, s. str. —*Antirrhinum linaria* M.B. Fl. taur.-cauc. II (1808) 75, non L.; Chav. Monogr. 125. —*l.c.*: Rchb. Ic. pl. crit. 20, tab. 624, 625; Sorn. rast. SSSR, IV, 108.

Perennial. Stem 30–55 cm tall, erect, simple, rarely branched, usually densely pubescent above with crispate, long, multicellular hairs. Leaves lanceolate or linear-lanceolate, acuminate, pubescent, thick, 1 or 3 veined,



with somewhat recurved margins, 2.5–5.5 cm long, (3)4–6 mm broad. Flowers in rather dense 6–15 cm long inflorescences. Pedicels 3–5(7) mm long, covered with long eglandular hairs. Bracts lanceolate, exceeding pedicels, villous. Calyx papillose-hairy inside and with isolated long hairs outside, calyx teeth narrowly lanceolate, 4–5 mm long, 1.5 mm broad. Corolla bright yellow, with orange patch in throat, 13–16 mm long (excluding spur); upper lip longer than lower, with 2 mm deep sinus; lower lip with rounded and narrow 2.5 mm broad lobes, middle lobe still narrower; spur 8–10 mm long, 2 mm broad at base. Capsule oblong, 8 mm long, 6.7 mm broad. Seeds discoid, with broad membranous margin, tuberculate in center, 2.5 mm in diameter. Flowering from June to July. (Plate VII, fig. 5.)

In steppes.—*European USSR*: Middle Dnieper (?), Black Sea Region, Lower Don (southwest), Crimea. Endemic. Described from Podolia. Type in Leningrad.

14. *L. ruthenica* Blonski in Wszechswiat (1895) 347, confer Borb. in Mag. Bot. Lap. I (1902) 117.—*L. italica* Trev. and *strictissima* Schur. Enum. pl. fl. Trans. (1866) 487.—*L. vulgaris* Fedtsch. Perech. rast. Turk-est. 5 (1913) 81, p.p. non Mill.—*L. biebersteinii* Grossh. Opred. rast. Kavk. (1949) 305, non Bess. (1822).—*L. maeotica* Klok. in Bot. zhurn. SSSR, XXXIV, 1 (1949) 73.—*L. tesquicola* Klok. l.c. 74.—*Exs.*: Fl. Hung exs. No. 466 (quoad pl.).

Perennial. Stem 30–65 cm tall, erect, branched or simple above, glabrous, or sparsely hairy in lower part. Leaves linear-lanceolate, usually single-veined, glabrous, 3–5 cm long and 1.5–5 mm broad; upper leaves linear, rather thick. Flowers in lax or somewhat dense, paniculate inflorescence. Pedicels 1.5–3 mm long, glabrous. Bracts linear-lanceolate, acuminate, glabrous. Calyx glabrous outside, papillose-hairy inside, teeth lanceolate, 2.5–3 mm long, glabrous inside. Corolla bright yellow, with orange patch in throat, 9–12 mm long (excluding spur); upper lip exceeding lower, with 2 mm deep sinus; lower lip with narrow and rounded 2 mm broad lobes, middle lobe narrower; spur 5.5–7 mm long, 1 mm broad at base. Capsule oblong-globose, 6–7 mm long, 5.06 mm broad. Seeds discoid, with broad membranous margin and somewhat tuberculate in center, 2.5 mm in diameter. June to August. (Plate VII, fig. 3.)

In steppes, along steppe river banks.—*European USSR*: Volga-Kama (south), Middle Dnieper, Volga-Don (south), Trans-Volga Region (south), Black Sea Region, Lower Don, Lower Volga. *Caucasus*: Dagestan; *Soviet Central Asia*: Aral-Caspian Region (north); *Western Siberia*: Upper Tobol Irtys. *General distribution*: southeastern Europe. Described from Podolia. Type in Leningrad.

*Note.* The name *L. ruthenica* Blonski, used by us here for the common steppe, toadflax, though provisional to a large extent, may be retained until it is clarified whether this steppe species is splitting up into a series of small species, as suggested by M.V. Klovov, or whether it represents a single species, perhaps somewhat polymorphic, distributed from Hungarian steppe to Mongolia.

15. *L. schelkovanikovii* Schischk. ex Grossh. and Schischk. in Sched. ad Herb. Pl. or exs. (1924) 42; Grossh. Fl. Kavk. III, 372.—*L. somchetica* Bordz. in Izv. Kievsk. bot. sada, V–VI (1927) 20.—*Exs.*: Pl. or. exs. No. 169.

Perennial. Plant entirely glabrous. Stem 30–50 cm tall, erect, simple or branched above. Leaves, flat, linear or linear-lanceolate, acuminate, with one sharply prominent vein, 3–4 cm long, 2–3 mm broad, with recurved margins. Flowers in dense spicate 5–12 cm long inflorescence, axis glabrous. Bracts 2–4 mm long, lanceolate, as long as pedicels. Calyx glabrous, lobes oblong, subobtuse, with scarious margin, 4–5 mm long, 1.5 mm broad, pubescent inside. Corolla yellow, 13–15 mm long (excluding spur), with bright orange umbo on lower lip, upper lip shallowly incised, with 2 mm deep sinus, and angular, rounded lobes; lobes of lower  
201 lip ligulate; spur curved, 10–12 mm long, 3 mm broad. Capsule globose, 4–5 mm in diameter. Seeds discoid, with broad membranous margin, tuberculate in center. June to July.

On subalpine grasslands. *Caucasus*: southern Transcaucasia. Described from Armenia. Type in Tbilisi, isotype in Leningrad.

*Note.* In 1947, we published in "Reports" of Akad. Nauk Azerbaijan SSR, vol. III, jointly with R.Ya. Rza-Zade, the new species *L. grossheimii* Kuprian., similar to *L. schelkovnikovii* Schischk. Typical specimens were collected from northern slopes, at an altitude of 1500 m, in the Kelbajar Region of Azerbaijan SSR. We are not including this species in the present work, since further collections are necessary, as it has been established on the basis of extremely inadequate material.

Series 8. *Vulgares* Klok. in Bot. Zhurn. SSSR, XXXIV, 1 (1949) 75.—Plants glabrous. Inflorescence axis and pedicels sometimes glandular-hairy, calyx wholly glabrous inside. Plants common on grasslands and in river valleys, pine forests, sandbanks, or as weeds.

16. *L. vulgaris* Mill. Gard. Dict. ed. VIII (1768) No. 1; Ldb. Fl. Ross. III, 206; Syreistsch. III. fl. Mosk. gub. III, 135; Schmalh. Fl. II, 264; Grossh. Fl. Kavk. III, 37.—*L. vulgaris* var. *communis* Kryl. Fl. Zap. Sib. X (1939) 2, 418; Maevsk. Fl. 451.—*Antirrhinum linaria* L. Sp. pl. (1753) 616.—*Exs.*: GRF, No. 984, No. 3767; Fl. pol. exs. No. 371.



Plate VIII.

1. *Linaria pontica* Kuprian., general appearance of plant, flower, seed; 2. *L. genistifolia* (L.) Mill., portion of inflorescence, flower; 3. *L. syspirensis* C. Koch, portion of stem and inflorescence; 4. *L. macrophylla* Kuprian., portion of stem; 5. *L. cretica* Kuprian., general appearance of plant, flower, seed; 6. *L. cretacea* Fisch., general appearance of plant.



Perennial. Root fusiform or with long trailing shoots. Stems 30–60(90) cm tall, erect, simple or branched densely leafy. Leaves lanceolate-linear or linear, acuminate, with 1, rarely 3 veins and recurved margins, glabrous, 2–5(7) cm long and 2–4(5) mm broad; upper leaves linear. Flowers in 5–15 cm long dense racemes, axes, pedicels and rarely calyces glandular-hairy, very rarely subglabrous. Pedicels 2–8 mm long. Bracts lanceolate, exceeding or equaling pedicels. Calyx lobes lanceolate, slender-acuminate, mostly glabrous or with a few glands on outer side, glabrous inside, 3 mm long and 2 mm broad. Corolla yellow, with bright orange umbo on lower lip, 15–18 mm long (excluding spur); upper lip much exceeding lower lip, with 2.5–3 mm deep sinus, lower lip with rounded lobes, 5 mm broad, middle lobe narrower; spur broad-conical, curved, 12–15 mm long, 2.5–3 mm broad at base, bright yellow. Capsule oblong-elliptical, 9–11 mm long, 6–7 mm broad; seeds discoid with broad membranous margin, tuberculate in center. Flowering from June to August. (Plate VII, fig. 4.)

A very common plant near ditches, in wastelands, fields, among crops and growing in pine forests and also on sandbanks in forest areas.—*Arctic zone*: Arctic Europe; *European USSR*: Karelia-Lapland, Ladoga-Ilmen, Dvina-Pechora, Upper Dnieper, Upper Volga, Volga-Kama, Middle Dnieper, Volga-Don, Trans-Volga Region, Bessarabia, Black Sea  
202 Region, Lower Don (rare); *Western Siberia*: Ob' Region, Upper Tobol, Altai (rare); *Soviet Far East*: Ussuri (introduced). *General distribution*: Scandinavia, Atlantic and Central Europe. Described from Western Europe. Type in London.

*Note*. A somewhat polymorphic plant, varying in the nature of the inflorescences and leaves and their width. Significantly different are the plants of this species growing in sandy areas of pine forests, which have narrower leaves and a distinctive root system. Their primary root is usually weakly developed and penetrates the soil to a depth of no more than 2–5 cm, where it develops two lateral roots, spreading horizontally. *L. vulgaris* Mill. s. str. growing as a weed in cultivated fields usually has a well-developed primary root.

17. *L. acutiloba* Fisch. ex Rchb. Ic. pl. crit. V (1827) 14, f. 611; Ldb. Fl. alt. II, 444; Kuprian. in Tr. Bot. inst. Akad. Nauk SSSR, I, 9, 47.—*L. vulgaris* O. and B. Fedtsch. Perech. rast. Turkest. 5 (1913) 81, p.p. non Mill.—*L. vulgaris* var. *latifolia* Kryl. Fl. Zap. Sib. X (1939) 2418.—*Exs.*: GRF, No. 3786.

Perennial. Plant glabrous, bluish gray. Stem generally simple, ascending, 25–40(50) cm tall, densely leafy right up to inflorescence. Leaves 3-veined, rarely single-veined, large, broad, lanceolate, somewhat broadened in upper part, 3–5 cm long, 0.5–1.5 cm broad, gradually tapering or



rather short-acuminate. Flowers in terminal dense inflorescence. Pedicels 3–5(6) mm long, glabrous. Bracts lanceolate, equaling pedicels or, rarely, somewhat shorter. Calyx lobes ovate-lanceolate, glabrous within and outside, 3 mm long, 2–2.5 mm broad. Corolla yellow, with bright orange blurred patch in throat, 12–16 mm long (excluding spur); upper lip with 2 mm deep sinus, lower lip with broad rounded lobes; spur broad-conical, curved, 2–3 mm broad at base. Capsule oblong-globose, 8–9 mm long, 7 mm broad. Seeds discoid, with broad membranous margin and tuberculate in center. July.

In pastures and river valleys.—*Arctic zone*: Arctic Europe; *Western Siberia*: Ob' Region, Irtysh, Altai; *Eastern Siberia*: Yenisey, Dauria (as far as Yablonovy Mountains), Lena-Kolyma. Endemic? Described from Dauriya from plants grown from seeds sent to Reichenbach by Fisher. Type in Leningrad.

*Note*. Distinguished from *L. vulgaris* Mill. by the complete absence of glandular pubescence on the inflorescence axis, pedicels and calyces, the broader, obovate calyx lobes and the much broader leaves, somewhat expanded in the upper part.

18. *L. melampyroides* Kuprian. in Tr. Bot. inst. Akad. Nauk SSSR, I, 9 (1950) 68.—*L. vulgaris* Kom. and Al. Opred. rast. Dal'nevost. kr. II (1932) 918, non *L.*

203 Perennial. Stem ascending, rarely erect, 20–80(50) cm tall, branched, sparsely leafy. Leaves linear-lanceolate, single-veined, 3–6 cm long and 3–5 mm broad, upper leaves linear, almost whorled. Flowers in lax, usually few-flowered inflorescences terminating stems. Pedicels 2–4 mm long, glabrous. Calyx glabrous inside, lobes lanceolate, subobtusely, 3 mm long, 1.5 mm broad. Corolla pale yellow, with bright violet throat, 13–15 mm long (excluding spur); upper lip much exceeding lower, with 3 mm deep sinus; lower lip with broad, rounded lobes, middle lobe much narrower; spur 8–10 mm long, 2 mm broad at base. Capsule oblong-globose, 7 mm broad, 8 mm long. Seeds discoid, with broad membranous margin, tuberculate in center. July–early August.

On sandy river banks and grasslands.—*Eastern Siberia*: Dauria (east); *Soviet Far East*: Zeya-Bureya, Ussuri, Uda Region. Endemic. Described from Trans-Baikal Region. Type in Leningrad.

*Note*. *L. melampyroides* Kuprian. apparently is a hybrid species, combining features of its ancestors *L. acutiloba* Fisch. and *L. japonica* Miq. It is distributed over an extensive area, covering almost the whole of Buryat-Mongolia and Primorski District, at the same time retaining the entire combination of features, thereby compelling us to consider *L. melampyroides* as a separate species.

Subsection 2. *Laeves* Kuprian.—Seeds discoid with broad membranous margin, smooth.

Series 9. *Popovianae* Kuprian.—Corolla yellow or yellow and brown; upper lip narrow, almost as long as lower; lobes of lower lip narrow, oblong-lanceolate; spur broad, straight. Leaves linear or filiform-linear. Plant common on rocky mountain slopes of Soviet Central Asia.

19. *L. popovii* Kuprian. in Tr. Bot. Inst. Akad. Nauk SSSR, I, 4 (1937) 319.—*L. ambigua* M. Pop. ex Baranov in Zhurn. Turkest. otd. Russk. Geogr. Obsch. XVII (1924–1925) 3, nomen, non Hult. (1853).

204 Perennial. Plant glabrous, glaucescent. Stems 5–6, erect or ascending, (15)40–80 cm tall, generally branched above. Leaves all flat, linear or linear-lanceolate; gradually tapering, with 1 or 3 veins, 3–5 cm long and 1.5–6 mm broad, erect or appressed to stem. Inflorescences lax, often paniculate, 5–15 cm long. Pedicels 1.5–2 mm long. Bracts equaling pedicels or a little shorter, lanceolate or lanceolate-linear. Calyx glabrous; lobes lanceolate-linear, 2 mm long, 1–1.5 mm broad. Corolla 10–14 mm long (excluding spur); yellow, with dirty brown or cinnamon brown lips, very rarely uniformly yellow; lower lip almost equaling upper, with 1–2.5 mm broad lobes; corolla tube 5–7 mm broad; upper lip 4 mm broad, short, with acuminate lobes, and 2 mm deep sinus; spur curved, 5–6(8) mm long. Capsule globose, 6 mm in diameter. Seeds smooth, with broad, margin. July to August. (Plate IX, fig. 1.)

Rocky steppe regions, juniper forests at altitudes of 2400–2800 m. *Soviet Central Asia*: Amu Darya, Syr Darya, Pamiro-Alai (up to Trans-Alai Range). Endemic. Described from Kugitang. Type in Tashkent.

20. *L. sessilis* Kuprian. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR XI (1949) 162; in Tr. Bot. inst. Akad. Nauk SSSR, I, 9, 47.

Perennial. Root fusiform. Plant bluish gray. Stems numerous, ascending, densely leafy. Leaves narrowly linear, semicylindrical, 2–3 cm long, 1–2.5 mm broad; lowermost leaves flat, fleshy. Flowers in short, rather compact or sometimes lax inflorescences, upper flowers sessile, lower subsessile. Bracts exceeding pedicels. Calyx glabrous, lobes oblong, subobtusate, 2–3(3–5) mm long, 1.5 mm broad. Corolla bright yellow, without spots in throat, 12–13 mm long (excluding spur); tube inflated, broad; upper lip scarcely longer than lower, with 1.5 mm deep sinus; lobes of lower lip narrow; spur almost straight, 5–8(10) mm long, 1–1.5 mm broad at base. Capsule globose, 6 mm in diameter. Seeds with broad membranous margin, smooth, 3.5 mm long, 2.5 mm broad. July to August. (Plate IX, fig. 2.)

In rubbly alpine regions at altitudes of 3600–4000 m. *Soviet Central Asia*: Pamiro-Alai (eastern Pamirs). Endemic. Described from western Hissar Range. Type in Leningrad.

*Note.* *L. sessilis* nob. is very similar to *L. popovii* nob., but distinguished by a uniformly yellow corolla, narrow, linear, fleshy leaves and a smaller plant size.

Series 10. *Kokanicae* Kuprian.—Corolla lilac or brownish lilac; upper lip narrow, almost as long as lower; lobes of lower lip narrow, oblong-lanceolate; spur rather short, straight. Leaves linear; lower leaves lanceolate or ovate. Plant common on calcareous or rocky mountain slopes of Soviet Central Asia.

21. *L. kokanica* Rgl. in A.P. Fedchenko, Putesh. v Turkest. No. 18 (1881) 60; O. and B. Fedtsch. Perech. rast. Turkest. 5, 81.—*Exs.*: Edit. Hort. Bot. Petri Magni, No. 90.

Perennial. Plant glabrous, green or glaucescent. Stem ascending, 15–20 cm tall, branched from base. Leaves all broad, ovate to lanceolate, rarely narrowly lanceolate, flat, 3-veined, 2–3.5 cm long, 0.5–1(2) cm broad, gradually narrowed toward base and apex. Flowers in dense compact terminal 2–5 cm long racemes. Pedicels very short, 1.5 mm long, reaching 3 mm in fruit. Bracts exceeding pedicels, lanceolate or linear-lanceolate. Calyx glabrous, lobes subobtuse, linear-lanceolate, 4–5 mm long, 1.5 mm broad. Corolla 15–18 mm long (excluding spur); lower lip brownish lilac, with orange patch in throat; and narrow, up to 2.5 mm long lobes, corolla tube yellow, 5–7 mm across; upper lip narrow, brownish-lilac, almost as long as lower, with 2.5 mm deep sinus; spur slender, curved, 5–8 mm long and 1.5 mm broad at base. Capsule globose, 7 mm in diameter. Seeds similar to those of the preceding species. April to May. (Plate IX, fig. 4.)

Pebbly steppe, talus. *Soviet Central Asia*: Syr Darya. Endemic. Described from Kokand. Type in Leningrad.

22. *L. kulabensis* B. Fedtsch. in Fedde, Repert. X (1912) 380; Perech. rast. Turkest. 5, 82.—*L. fastigiata* B. Fedtsch. l.c. non Chav.—*L. baldschuanica* B. Fedtsch. l.c. nomen.

Perennial. Plant glabrous, glaucescent. Stem ascending, 25–35 cm tall, branched in middle and upper parts. Lower leaves broadly lanceolate; upper lanceolate, 3-veined, 3–5 cm long, 7–15 mm broad, gradually tapering. Flowers crowded in paniculate inflorescence. Bracts lanceolate, shorter than or as long as 1.5–2 mm pedicels. Calyx glabrous, lobes subobtuse, lanceolate-linear 2–5 mm long, 1.5 mm broad. Corolla large (color not known), 12–13 mm long (excluding spur); lower lip with 3 narrow lobes, 1.5 mm broad; middle lobe slightly narrower; upper lip almost as



long as lower, with 1.5 mm deep sinus; spur 6–9 mm long and 1.5 mm broad at base. Capsule globose, 6 mm in diameter. Seeds smooth, with broad, membranous margin. August.

*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from Kulyab. Type in Leningrad.

23. *L. hepatica* Bge. in Ldb. Ic. pl. Fl. Ross. I (1829) tab. 91; Fl. alt. II, 445; Chav. Monogr. 134; Kryl. Fl. Zap. Sib. X, 2421.—*L. macrourea* γ. *hepatica* (Bge.) Benth. in DC. Prodr. X (1846) 273; O. and B. Fedtsch. Perech. rast. Turkest. 5, 83.

Perennial. Plant glabrous, glaucescent, rarely green. Stem ascending, 15–20(40) cm tall, branched from base. Lower leaves broadly lanceolate or linear lanceolate, flat, 3-veined, 4–5 cm long, 0.5–2(4) cm broad; upper leaves linear or filiform. Flowers 2–9, regularly spaced in lax 5–15 cm long inflorescence. Pedicels 3–5 mm long, elongated in fruit. Bracts slightly shorter than or equaling pedicels. Calyx glabrous, lobes fleshy, 1.5–2.5 mm long and about 2 mm broad, ovate or oblong-elliptical. Corolla large, 13–15 mm long (excluding spur); lower lip brownish violet with orange patch in throat; corolla tube light yellow, 6–8 mm broad; upper lip also brownish violet, almost equaling lower, with about 3 mm deep sinus; spur slender, straight, 7–10 mm long and 1.5 mm broad at base. Capsule somewhat globose or ellipsoid, slightly elongated, 7.5–10 mm long and 6–8 mm in diameter. Seeds black, smooth, with broad, membranous margin, 2.5 mm broad, 3 mm long. June.

On rocky and rubbly mountain slopes.—*Western Siberia*: Altai mountains (south); *Soviet Central Asia*: Dzh.-Tarbagatai (Tarbagatai and north-eastern part of Semipalatinsk Province). Described from Kurchum River. Type in Paris.

Series 11. *Praecoces* Klok. in mss.—Corolla lilac, 10–15 mm long; upper lip much longer than lower; lobes of lower lip broad, ovate; spur slender, curved. Plants common on stony and pebbly slopes and sands of Soviet Central Asia.

24. *L. bungei* Kuprian. in Tr. Bot. inst. Akad. Nauk SSSR I, 2 (1936) 298; Pavlov, Fl. tsentr. Kazakhst. III, 135; Kryl. Fl. Zap. Sib. X, 2421.—*L. praecox* Bge. in Ldb. Ic. pl. Fl. Ross. V (1834) tab. 431; Fl. alt. II, 446, non Hoffmg. and Link (1809); Chav. Monogr. 135.

Perennial. Stems ascending, 3–4, with a few vegetative shoots, 30–35 cm tall, generally simple or rarely with one or two vegetative branches. Leaves narrowly linear or filiform, 3.5–4.5 cm long and 1.5–2 mm broad; densely arranged in lower part of stem, regularly spaced in upper part, upper leaves semicylindrical, ribbed. Flowers in lax 6–10 cm long, 5–16-flowered inflorescences. Pedicels 3–5 mm long.



Bracts 1.5–3 mm long. Calyx glandular-hairy, lobes lanceolate, subobtusate, 3 mm long, 1.5 mm broad. Corolla lilac-colored, spur and tube pale lilac, with fine dark veins, lips deep lilac, throat with orange patch, corolla 10–12 mm long (excluding spur); lobes of lower lip narrow, 1 mm broad, middle lobe slightly narrower than lateral ones; upper lip bifid, with 1.5 mm deep sinus; spur slender, 10 mm long, 1 mm broad at base, slightly curved. Capsule globose, 5–6 mm in diameter. Seeds black, with membranous margin, 2 mm long, 1 mm broad. April to May. (Plate IX, fig. 6.)

On rubbly mountain slopes. *Western Siberia*: Altai Mountains. Endemic. Described from Altai Range. Type in Leningrad.

25. *L. transiliensis* Kuprian. in Tr. Bot. inst. Akad. Nauk SSSR, I, 9 (1950) 69.—*L. odora*  $\delta$ . *violacea* Ldb. Fl. Ross. III (1847–1894) 208.

Perennial. Stem ascending, with a few vegetative shoots at base, (30)40–50 cm tall, branched. Leaves linear, flat, 3–5 cm long, (1.5)2–6 mm broad. Inflorescence terminal, lax, 6–10 cm long, 5–16-flowered. Pedicels  
207 3–5 mm long. Bracts equaling or shorter than pedicels. Calyx glabrous or with isolated hairs at base, lobes ovate or lanceolate, subobtusate, 3 mm long, 1.5–2 mm broad. Corolla lilac, 13–15 mm long (excluding spur); lobes of lower lip narrow, rounded, 2–3 mm broad, middle lobe much narrower than lateral ones; upper lip bifid, with 2–5 mm deep sinus; spur long, long tapering (11)12–15 mm long and 2 mm broad at base. Capsule globose, 5–6 mm in diameter. Seeds smooth with broad membranous margin. Flowering from second half of May to June. (Plate IX, fig. 7.)

On steppe mountain slopes, in clayey soils and chernozem or on rubbly slopes in forest zone.—*Soviet Central Asia*: Dzh.-Tarbagatai, Tien Shan. Endemic. Described from Trans-Ili Ala-Tau. Type in Leningrad.

26. *L. ramosa* (Kar. and Kir.) Kuprian. comb. nov.—*L. praecox*  $\beta$ . *ramosa* Kar. and Kir. in Bull. Soc. Nat. Mosc. XV (1842) 145.—*Exs.*: Kar. and Kir. l.c. No. 1785.

Perennial. Stems 35–40 cm tall, numerous, profusely branched, branches erect in middle and above. Leaves narrowly linear or filiform-linear, 3–4 cm long, 1.5–2 mm broad, semicylindrical, ribbed, regularly spaced inflorescence terminal, few-flowered, rather long, lax. Pedicels 2.5 mm long, elongated in fruit. Bracts 2 mm long, usually not longer than pedicels, sometimes equaling them. Calyx entirely glabrous, lobes fleshy, 2 mm long and 1 mm broad, subobtusate. Corolla uniformly lilac with only a light yellowish tinge in throat, (10)12–13 mm long (excluding spur); lobes of lower lip narrow, 2–2.5 mm broad, middle lobe almost equaling them; upper lip bifid, with 1.5–2 mm deep sinus; spur very slender, 10 mm long. Capsule globose, 5 mm in diameter. Seeds black,

shiny, with broad membranous margin, 3 mm long. Flowering in June, early July.

On sandy hillocks. *Soviet Central Asia*: Balkhash Region (sands in Muyunkum and Balkhash regions). Endemic. Described from Dzhungaria. Type in Moscow. Isotype in Leningrad.

*Note.* Hybridizes with *L. pedicellata* along the shores of Lake Balkhash.

Series 12. *Odorae* Klok. mss.—Stems branched from base. Corolla yellow, 5–10 mm long; spur conical or slightly curved, 4–9 mm long. Inflorescence short. Plant common on rubbly slopes, in sandy areas of pine forests, sandy channel beds and dunes.

27. *L. altaica* Fisch. in Ldb. Fl. alt. II (1630) [sic] 448; Kuprian. in Tr. Bot. inst. Akad. Nauk SSSR, I, 2, 29; Pavlov, Fl. tsentr. Kazakhst. III, 136; Kryl. Fl. Zap. Sib. X, 2420, p.p.—*L. odora* Korsh. Tent. Fl. Ross. or. (1898) 310. non Fisch.—*L. odora*  $\alpha$ . *major* Krylov, Fl. alt. IV (1907) 927.—*L. uralensis* Kotov in Bot. zhurn. Akad Nauk USSR, III, 3–4 (1946) 26.

208 Perennial. Plant glabrous, Stems 15–20(30) cm tall, numerous or often solitary, ascending, branched in lower part, rather densely leafy. Leaves 4–6(11) mm apart, linear, 3.5–4 cm long and 1–1.5(2) mm broad, fleshy, semicylindrical, ribbed at base, subobtuse. Inflorescence lax, 2.5–5 cm long, 2–8-flowered. Pedicels mostly 5–7 mm long (very rarely 3 mm). Calyx subglabrous, with isolated glandular hairs at base and along margins of lobes. Corolla light yellow, (8)9–10 mm long; with two orange stripes in throat; spur slender, pointed, straight or slightly curved, 8–9 mm long. Capsule globose or slightly elongated, 4 mm in diameter. Seeds smooth, with membranous margin, 2 mm long. June.

*Western Siberia*: Upper Tobol (southern Urals, Ulutau, Mugodzhary), Altai Mountains. Endemic. Described from Altai Range. Type in Leningrad.

28. *L. dolichocarpa* Klok. sp. nov. in Addenda XXI, 818.

Perennial. Stems 20–50 cm tall, solitary or 2–3, branched from base; branches erect, spreading. Leaves linear-filiform, semicylindrical, ribbed, 20–50 mm long, 1 mm broad. Flowers in lax 2–5 cm long racemes, terminating almost every branch. Pedicels 2–3 mm long. Bracts as long as or slightly shorter than pedicels. Calyx glabrous, lobes linear, slightly tapering, 1.5–2 mm long, 1 mm broad. Corolla 8–9(10) mm long (excluding spur); lobes of lower lip rounded; middle lobe 1.5 mm broad, lateral ones 2 mm broad; upper lip straight, with 2 mm deep sinus; spur straight or slightly curved, (6)7–8 mm long. Capsule oblong-ovoid, 6 mm long,

3–4 mm broad. Seeds discoid, with broad margin, 3 mm long. Flowering from June to first half of July.

Channel sandbanks, sometimes pine forests. *Western Siberia*: Tobol; *Soviet Central Asia*: Aral-Caspian region (northeastern section). Endemic. Described from northeastern Kazakhstan. Type in Leningrad.

29. *L. odora* (M.B.) Fisch. in Cat. hort. Gorenk. (1812) 25, nom.; Chav. Monogr. 136; Fl. Yugo-Vost. VI, 196.—*L. juncea* Rchb. Pl. crit. V (1827) 15.—*Antirrhinum odorum* M.B. Fl. taur.-cauc. II (1808) 414.—*A. junceum* Pall. Reise, III (1773) 541, Anh. 862; Böbler in Pall. N. nord. Beitr. VI, 263, non L.—*A. monspessulanum* Georgi, Beschr. Russ. Reich. III, 5 (1800) 1106, non L.

Perennial. Plant glabrous, or with soft bluish gray bloom. Stem 15–40 cm tall, ascending, with numerous, more or less erect branches. Leaves linear-filiform, 15–40 mm long, 1 mm broad, semicylindrical, ribbed, 1–3 cm apart. Flowers in short, lax 2–5 cm long racemes, terminating most branches. Pedicels short, 1.5–3 mm long. Bracts 2–2.5 mm  
209 long. Calyx glabrous, 1.5–2 mm long, lobes fleshy, lanceolate, acuminate, subobtusate in fruit. Corolla 6–8 mm long (excluding spur), light yellow; lower lip more or less flat; lateral lobes ovate, middle much narrower; upper lip bifid; spur short, very slender, 5 mm long, conical, generally straight. Capsule more or less ellipsoid, 5–6(7) mm long, 3–4 mm broad. Seeds 3 mm long, discoid, with broad membranous margin. Flowering May to July.

On sandy river beds.—*European USSR*: Lower Volga; *Western Siberia*: Upper Tobol. Endemic. Described from Lower Volga. Type in Leningrad.

30. *L. dulcis* Klok. in Bot. zhurn. SSSR, XXXIV, 1 (1949) 71; Kuprian. in Tr. Bot. inst. Akad. Nauk SSSR, I, 9 (1950) 48.—*L. odora* Schmalh. Fl. Yugo-Zap. Ross (1886) 429, p.p. non Chav.—*Exs.*: GRF, No. 577.

Perennial. Plant glabrous, glaucescent, stem 15–30(45) cm tall, ascending, profusely branched, branches spreading, lower ones procumbent. Leaves linear-filiform; lower leaves linear, 15–40 mm long, 1–2.5 mm broad, semicylindrical, ribbed, lowermost fleshy, flat. Flowers in lax 2–5 cm long racemes, terminating most branches. Pedicels 1–5 mm long. Bracts 1–3(5) mm long. Calyx glabrous, 2–2.5 mm long, lobes fleshy, pointed. Corolla 7–8 mm long (excluding spur); middle lobe of lower lip 2.5–3 mm long, 2–2.5 mm broad, lateral lobes as long, but 2.5–3.5 mm broad; middle lobe much narrower than lateral ones; upper lip 2.5–3.5 mm long, with 1.5–2 mm deep sinus between lobes; spur straight, tapering, 5–6.5 mm long. Capsule globose or globose-pyriform, 3(4)–5 mm



in diameter. Seeds 3 mm long, discoid, with broad membranous margin. June to August.

On sandy riverbed terraces. *European USSR*: Black Sea Region, Lower Don, Middle Dnieper, Volga-Don, Endemic. Described from Ukraine. Type in Leningrad.

*Note*. Very similar to preceding species, from which it is distinguished only by the length of the spur and the width of the leaf. Both species are also ecologically very close.

31. *L. loeselii* Schweig. in Königl. Arch. I (1812) 228; Lorek, Fl. Pruss. ed. 3, 150, f. 800; Kuprian. in Tr. Bot. inst. I, 9, 48. — *L. maritima* Rchb. Fl. exc. (1830) 375, non DC. (1808).

Perennial. Stem stout, solitary, ascending, branching only in upper part; up to 40 cm tall. Leaves linear or linear-lanceolate, acuminate, flat, rather thick, up to 5 cm long and 4 mm broad. Inflorescence 2–12 cm long, 2–16-flowered. Pedicels thickened, 5–7 mm long. Bracts variable: shorter, equaling or, sometimes, even exceeding pedicels. Calyx 3.5 mm long, glabrous; lobes oblong-lanceolate or lanceolate, somewhat thickened. Corolla yellow, 8–10 mm long (excluding spur); spur short, 4.5–5(6) mm  
210 long, curved. Capsule 6–7 mm long and 4 mm broad. July to August.

On coastal sand dunes.—*European USSR*: Baltic Region (Kaliningrad Region, Latvia, Lithuania). Endemic? Described from Prussia. Type in Berlin?

32. *L. brachyceras* (Bge.) Kuprian. in Tr. Bot. inst. Akad. Nauk SSSR I, 9 (1950) 48.—*L. loeselii*  $\gamma$ . *brachyceras* Bge. in Ldb. Fl. alt. II (1830) 448.—*L. odora*  $\beta$ . *brachyceras* Ldb. Fl. Ross. III (1847–1849) 208.—*L. odora* (M.B.) Chav. ssp. *brachyceras* Kuprian. in Tr. Bot. inst. Akad. Nauk SSSR, I, 2 (1936) 296; Kryl. Fl. Zap. Sib. X, 2421.

Perennial. Stem 15(20)–45 cm tall, solitary, profusely branched from base; branches erect, densely leafy. Leaves linear-filiform, semicylindrical, ribbed, 25–50 mm long and 2.5 mm broad. Flowers 2–3(5) in short lax racemes. Pedicels 5–6 mm long. Bracts linear, 1.5–2 mm long and 1 mm broad. Calyx lobes linear, acuminate, 1.5–2 mm long and 1 mm broad. Corolla 8–10 mm long (excluding spur); lobes of lower lip rounded; middle lobe 1 mm broad, lateral 2 mm broad; upper lip straight, with 2.5 mm deep sinus; spur short, straight, 4–5 mm long. Capsule globose. Seeds similar to preceding species. July.

In pine forest sand banks.—*Western Siberia*: Irtysh (along Irtysh River). Endemic. Described from Irtysh sands. Type in Leningrad.

Series 13. *Dolichoceras* Kuprian.—Stems branched only in upper part. Leaves regularly spaced. Corolla 10–15 mm long; spur slender, curved, 7–12 mm long. Inflorescences elongated. Plant common on coastal,



slightly saline sandy and limestone areas of the Mangyshlak Peninsula and rocky mountain slopes of Central Kopet-Dag.

33. *L. dolichoceras* Kuprian. in Tr. Bot. inst. Akad. Nauk SSSR, I, 2 (1936) 298 and I, 9 (1950) 49; Pavlov Fl. tsentr. Kazakhst. III, 136; Maevsk. Fl. ed. 8, 452.

Perennial. Stems tall, up to 55 cm, ascending, poorly branched or unbranched, numerous, rarely solitary. Leaves narrowly linear, slightly fleshy, somewhat flat, 3–6 cm long, 1–1.5(2.5) mm broad, widely spaced, 1.5–4 cm apart. Inflorescence lax, 3–14 cm long. Pedicels short. Calyx 3.5–4 mm long, glabrous, lobes lanceolate, acuminate. Corolla light yellow, 10–11 mm long (excluding spur); spur long, slender 7–10 mm long, 4 mm broad. Seeds discoid with membranous margin, 3 mm long and 2.5 mm broad. May to June.

In sandy regions.—*European USSR*: Lower Volga; *Soviet Central Asia*: Aral-Caspian Region. Endemic. Described from Lower Volga. Type in Leningrad.

- 211 34. *L. leptoceras* Kuprian. in Tr. Bot. inst. Akad. Nauk SSSR, I, 2 (1936) 299, and I, 9 (1950) 49.

Perennial. Plant glabrous, glaucescent, 10–40(45) cm tall, Stems ascending, branched above or from base, branches spreading. Leaves 5–20 mm long, 1.5–2.5 mm broad, more or less appressed to stem, linear-lanceolate or lanceolate, acute, midrib prominent on lower surface. Flowers 2–12, on short, 1.5–2(3) mm long pedicels, 6–17 mm apart, in 5–8 cm long inflorescence. Calyx 3–3.5 mm long, subglabrous, lobes oblong-elliptical, acuminate. Corolla yellow, with orange patch in throat; tube with very fine, dark stripes; spur slender, curved, pointed 9–10(12) mm long. Capsule globose, 5 mm in diameter. Seeds discoid, with scarious margin, 3 mm long, 2.5 mm broad. Flowering from May to June.

On calcareous and stony slopes.—*Soviet Central Asia*: Aral-Caspian Region (Mangyshlak Peninsula). Endemic. Described from Mangyshlak Peninsula. Type in Leningrad.

35. *L. pedicellata* Kuprian. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XI (1949) 161; in Tr. Bot. inst. Akad. Nauk SSSR, I, 9, 49.

Perennial. Plant glabrous, glaucescent. Stems 20–35 cm tall, 2–3, branched or simple. Leaves fleshy, widely spaced, lower leaves linear, upper filiform, semicylindrical. Flowers 5–7 in lax 5–10 cm long inflorescence. Pedicels of lower flowers 4–5 mm long; upper shorter, 2–3 mm long. Bracts equaling pedicels. Calyx glabrous, lobes lanceolate, fleshy, 2.5–3 mm long, 1.5 mm broad. Corolla yellow, with orange spots in throat, 15–17 mm long (excluding spur); lateral lobes of lower lip 3–4 mm broad

acute, middle narrow, 2 mm broad; upper lip with sinus up to 3 mm deep; corolla tube 6 mm broad; spur slender, acuminate, 10–12 mm long. Capsule globose, 5 mm in diameter. Seeds black, shining, with broad membranous margin. Flowering from April to May. Fruiting June. (Plate fig. 3.)

On sandy hillocks.—*Soviet Central Asia*: Balkhash Region. Endemic. Described from the Balkhash Region. Type in Leningrad.

36. *L. striatella* Kuprian. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XI (1949) 160; in Tr. Bot. inst. Akad. Nauk SSSR, I, 9, 49.

212 Perennial. Plant slender, glaucescent. Stems 3–4, 25–45 cm tall, ascending, branched, sparsely leafy. Leaves linear-filiform, 2–3.5 cm long, 1 mm broad, slightly ribbed. Inflorescence lax, 3–10 flowered. Pedicels 2.5–3(5) mm long. Bracts linear, equaling or slightly shorter than pedicels. Calyx glabrous or with sparse, short, glandular hairs; lobes somewhat fleshy, linear, subobtusate, 3 mm long. Corolla 7–12 mm long (excluding spur), pale yellow, with fine blue veins; lobes of lower lip oblong-ovate, rounded, 3 mm broad, densely pilose in throat with golden orange spots; upper lip exceeding lower lip, with 1–1.5 mm deep sinus; spur slender, 10 mm long. Capsule globose or ellipsoid, 6 mm long and 5 mm broad. Seeds smooth, with broad membranous margin, 3 mm long, 2 mm broad. July (Plate IX, fig. 5.)

On stony and rubbly slopes.—*Soviet Central Asia*: mountainous Turkmenia (Kopet-Dag). Endemic. Described from Kopet-Dag. Type in Leningrad.

Series 14. *Rupestris* Kuprian.—Leaves whorled, linear-lanceolate, flat. Calyx lobes slender, scaly, calyx and pedicels glandular hairy. Corolla yellow, 17 mm long (excluding spur). Plant common on stony mountain slopes of the Caucasus.

The one species here is endemic to the Daryal Ravine. Benthham assigned this species to the western Mediterranean section *Supinae*.

*L. meyeri* is closest to the species of the series *Macrourae* because of the pubescence of the thin scaly calyx lobes, very similar corolla and alternate leaves. If *L. meyeri* is referred to section *Supinae*, all species of series *Macrourae* should also be shifted. However, at present we have not decided to do so.

37. *L. meyeri* Kuprian. in Tr. Bot. inst. Akad. Nauk SSSR, I, 9 (1950) 50.—*L. rupestris* C.A. Mey. Verz. Pflanz. Cauc. Casp. Meer. (1831) 110, non Guss. 1828; Ldb. Fl. Ross. III, 212; Grossh. Fl. Kavk. III, 371.

Perennial. Plant glabrous, glaucescent. Stems 10–15 cm tall, slender, 3–5 or more, ascending, branched. Leaves alternate, regularly spaced, flat, linear, rarely narrowly lanceolate with prominent midrib, 2–3 cm





long and 2–5 mm broad. Flowers in lax terminal racemes. Bracts lanceolate to ovate-lanceolate, equaling pedicels or shorter. Pedicels and calyx glandular-hairy. Calyx lobes ovate, subobtusate, with scarious margin. Corolla yellow, 7 mm long (excluding spur); upper lip slightly longer than the lower, sinuate, with rounded lobes; lower lip with orange spots in throat, and broad, rounded lobes; spur curved, 10–12 mm long, 1.5–2 mm broad at base. Capsule oblong-globose. Seeds discoid, with broad membranous margin, smooth. July.

- 215 On steep stony slopes at 1700–1950 m altitudes. *Caucasus*: Ciscaucasia. Endemic. Described from Daryal Ravine. Type in Leningrad.

Series 15. *Macrourae* Kuprian.—Calyx with slender scaly lobes, covered with glandular and simple hairs. Corolla yellow or lilac, with blue veins. Leaves linear or filiform-linear, flat or semicylindrical. Plant common on stony open spaces and steppes.

38. *L. debilis* Kuprian. in Sov. bot. (1936) 4, 115; Pavlov, Fl. tsentr. Kazakhst. III, 134.—*L. loeselii*  $\alpha$ . *minor* Ldb. Fl. alt. II (1830) 447.—*L. macroura* Korsh. Tent. Fl. Ross. or. (1898) 309, p.p. non M.B.—*L. altaica* Kryl. Fl. Zap. Sib. X (1939) 2420, p.p., non Fisch.

Perennial. Plant slender, short, glaucescent. Stem solitary, ascending, sometimes branched at base, 10–18(20) cm tall, densely leafy in lower part. Leaves acicular, sometimes on same side, filiform-linear, fleshy, upper surface ribbed, lower keeled; lower leaves 4–7 mm long, subobtusate, upper 2.5–4 cm long and 1 mm broad, acuminate. Inflorescence lax, 2–5 flowered, terminating stem. Bracts 1.5–2 mm long, linear-lanceolate. Pedicels 2–3 mm long, glandular-hairy, as also inflorescence axis. Calyx 4–5 mm long; lobes oblong, subacute, 1.5–2 mm broad. Corolla yellow, with fine bluish stripes; spur slightly curved, 12–16 mm long, 4–6 mm broad; upper lip 9 mm long and 7 mm broad in upper part. Capsule globose, 6 mm in diameter. Seeds 2 mm long and 1.5 mm broad, smooth.

Stony steppes.—*Western Siberia*: Upper Tobol (eastern slopes of southern Urals). Altai Mountains (Chuisk steppe). Described from the Ural area. Type in Leningrad.

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Plate IX.

1. *Linaria popovii* Kuprian., general appearance of plant, flower, leaf, portion of inflorescence;—2. *L. sessilis* Kuprian., general appearance of plant, leaf;—3. *L. pedicellata* Kuprian., inflorescence, flower;—4. *L. kokanica* Rgl., general appearance of plant, flower;—5. *L. striatella* Kuprian., portion of stem with inflorescence, flower, seed;—6. *L. bungei* Kuprian., portion of stem with inflorescence, flower, calyx lobe;—7. *L. transiliensis* Kuprian., portion of stem with inflorescence, flower, calyx lobe.



39. *L. incompleta* Kuprian. in Sov. bot. (1936) 4, 114; Pavlov. Fl. tsentr. Kazakhst. III, 135; Maevsk. Fl. 452; Kryl. Fl. Zap. Sib. X, 2419; Grossh. Opred. rast. Kavk. 306.—*L. macroura*  $\alpha$ . *simplex* Ldb. Fl. alt. II (1830) 446.—*L. macroura* auct. Fl. ural., aralo-casp., alt. non M.B.

Perennial. Plant glaucescent, with vegetative shoots. Stems numerous, erect, 25–30 cm tall, densely leafy in lower part. Leaves fleshy, linear-filiform, 2.5–5 cm long, 2 cm [mm] broad, ribbed, lower leaves somewhat flat. Inflorescence underdeveloped, only 3–7 flowers developing. Pedicels 2 mm long, sparsely glandular-hairy, as also inflorescence axis. Calyx 5 mm long, glandular-hairy (or glabrous), lobes unequal, the broadest elliptical, the rest oblong, all subacute, 4 mm long, 2–3 mm broad. Corolla yellow with fine bluish stripes and orange spots in throat, (13)15–18 mm long (excluding spur); spur curved, deep yellow, 15–20 mm long and about 3 mm broad in upper part; corolla tube 7–8 mm long and 6 mm broad; upper lip 12–15 mm long, 8–9 mm broad above. Capsule large, oblong, 8–9 mm long. Seeds smooth, with broad membranous margin, 2.5–3 mm long, 2–2.5 mm broad. June.

In steppes, in limestone and marl outcrops.—*European USSR*: Trans-Volga Region, Lower Volga; *Caucasus*: Ciscaucasia (northern Ossetia), Dagestan; *Western Siberia*: Upper Tobol, Irtysh; *Soviet Central Asia*: Aral-Caspian Region (northeastern section), Balkhash Region. Described from Trans-Volga Region. Type in Leningrad.

40. *L. macroura* (M.B.) Chav. Monogr. (1833) 13; Fedtsch. and Fler. Fl. Evrop. Ross. III, 851; Kuprian. in Sov. Bot. 4, 113; Grossh. Opred. rast. Kavk. 306.—*Antirrhinum macrourum* M.B. Fl. taur.-cauc. III (1819) 413.—*L. besseriana* Rchb. Ic. pl. crit. V (1827) 623.—*L. macroura*  $\beta$ . *besseriana* Chav. l.c.—*Ic.*: M.B. Pl. rar. ross. I, tab. 27.

Perennial. Plant glaucescent, with vegetative shoots. Stems erect, solitary or few, 35–60 cm tall, 3–4 mm in diameter, sparsely leafy at base. Leaves linear or filiform-linear 3–5 cm long, 1.5–2 cm [mm] broad. Inflorescence short, 4–6(10) mm long, compact. Flowers all developing. Calyx 7 mm long, glandular-hairy, lobes unequal, the broadest lobes broadly ovate, the narrowest oblong. Corolla yellow, 18–22 mm long excluding spur, with fine bluish hairs and orange spots in throat; spur 12–16 mm long, straight, conical; corolla tube 5–6 mm long and 7–8(10) mm across; lower lip large, the upper barely exceeding it, 10–13 mm long, 8–9 mm broad in upper part. Capsule oblong, 12–14 mm long, 7–8 mm broad. Seeds smooth, with broad membranous margin, 2.5–3 mm long, 2.5 mm broad. April to May.

In steppes.—*European USSR*: Black Sea Region, Lower Don (west), Crimea; *Caucasus*: Ciscaucasia (east). Endemic. Described from Crimea. Type in Leningrad.

41. *L. schirvanica* Fom. in Izv. Kavk. muz. III (1908) 283; Grossh. Fl. Kavk. III, 370.—*L. violacea* Mey. in herb.—*Exs.*: Herb. Fl. cauc. No. 389.

Perennial. Stem ascending, simple, 20–40 cm tall, densely leafy in lower part. Leaves alternate, linear, fleshy, flat, acuminate, 3–5 cm long and 2–3 mm broad. Inflorescence racemose, up to 10 cm long. Bracts lanceolate-linear, almost equaling pedicels. Pedicels 3–4 mm long. Calyx lobes linear-lanceolate or ovate, 5 mm long, 1.5–2.5 mm broad, scaly, glandular-hairy. Corolla lilac, 15–20 mm long; upper lip deeply sinuate, exceeding lower lip; lower lip erect, orange in throat, with broadly rounded lobes; spur curved, 12 mm long and 1.5 mm broad at base. Capsule oblong-globose, 8 mm long. Seeds discoid, with broad membranous margin, smooth, 3 mm in diameter. May.

217 In steppes.—*Caucasus*: southern and eastern Transcaucasia. Endemic. Described from Transcaucasia. Type in Tbilisi.

42. *L. elymaitica* (Boiss.) Kuprian. comb. nov.—*L. lineolata*  $\beta$ . *elymaitica* Boiss. Fl. or. IV (1879) 379.—*L. striata* Ldb. Fl. Ross. III (1847–1849) 210, p.p. non DC.

Perennial. Plant glaucescent. Stem erect, 30–40 cm tall, branched only in upper part. Leaves linear, fleshy. Flowers crowded at ends of branches and main stem, forming short, often capitate inflorescences. Bracts linear, acuminate, equaling or exceeding pedicels. Pedicels 1.5–2 mm long, elongated in fruit. Calyx glabrous, lobes slender, narrow, acuminate, with scaly margin, 2 mm long, 1 mm broad. Corolla light yellow, with obscure veins, 8–10 mm long (excluding spur); spur slender, slightly curved, 5–7 mm long; upper lip bifid, with subobtuse lobes; lower lip white pubescent, lateral lobes narrow. Capsule globose. Seeds discoid, with broad membranous margin, smooth in center. June.

At 1350–1500 m altitudes.—*Caucasus*: Talysh (Zuvant). *General distribution*: Iran. Described from Iran. Type in Geneva.

Section 3. *Versicolores* (Benth.) Wettst. in Pflanzenfam. IV, 3 (1895) 59; Benth. in DC. Prodr. I, 275.—Annuals and perennials. Seeds elongated, trigonous, 0.5–1 mm long, rugose at angles or coarsely tuberculate. Inflorescence a panicle or spike. Corolla white, sky-blue, lilac or grayish violet. Leaves alternate or whorled.

Species of this section are widely represented in the western Mediterranean Region. The flora of the USSR includes only six species.

43. *L. chalepensis* (L.) Mill. Gard. Dict. ed. VIII (1768) No. 12; Boiss. Fl. or. IV, 381; Grossh. Fl. Kavk. III, 370.—*Antirrhinum chalepense* L. Sp. pl. (1753) 617.— *Ic.*: Sibth. and Sm. Fl. gr. tab. 592.—*Exs.*: Herb. Fl. Cauc. No. 243. (sub *L. armeniaca* Chav.).

Annual. Plant glabrous, green. Stem ascending, 10–20–35 cm tall. Simple, rarely branched, vegetative shoots with ovate-lanceolate leaves. Lower leaves whorled, linear, 2–5 cm long, 2 mm broad, upper alternate. Inflorescence lax. Bracts linear, slender acuminate, equaling pedicels. Pedicels 2–4 mm long. Calyx glabrous, lobes long, patent, longer than tube, 5–7 mm long, 1 mm broad, accrescent. Corolla 7 mm long (excluding spur), white, with yellow patch in throat; upper lip equaling lower lip, deeply bilobed; lobes of lower lip rather narrow, ligulate; spur filiform, curved, slender pointed, 10–12 mm long. Capsule globose, shorter than calyx teeth. Seeds trigonous, coarsely tuberculate, finely punctate. Flowering in May.

- 218 Talus in middle mountain zone.—*Caucasus*: southern and eastern Transcaucasia. *General distribution*: Mediterranean Region. Described from Italy. Type in London.

44. *L. armeniaca* Chav. Monogr. (1833) 147; Ldb. Fl. Ross. III, 210; Boiss. Fl. or. IV, 381; Grossh. Fl. Kavk. III, 370.—*L. segetalis* C. Koch in Linnaea, XVII (1843) 286.—*Exs.*: Herb. Fl. Cauc. No. 530.

Annual. Plant glaucescent, glabrous. Stem slender, simple or branched, 10–40 cm tall, ascending, vegetative shoots almost undeveloped. Leaves alternate, narrowly linear, flat, 2–4 cm long, 1–2.5 mm broad, acuminate. Flowers in lax racemes, terminating branches. Bracts filiform, shorter than pedicels. Pedicels slender, 5 mm or longer. Calyx glabrous, lobes linear, slender acuminate, 3 mm long, not patent, equaling corolla tube. Corolla sky-blue, yellowish in throat, 8 mm long (excluding spur); spur very slender, filiform, curved, slender pointed, 12–14 mm long; lower lip exceeding upper lip, lobes of lower lip elongated ligulate; upper lip deeply bifid. Capsule globose 4(5) mm in diameter. Seeds minute, 1 mm long, oblong, trigonous, rugose, finely punctate. May.

On southern stony slopes of middle mountain zone.—*Caucasus*: western, southern and eastern Transcaucasia. *General distribution*: Asia Minor. Described from eastern Anatolia. Type in Paris.

45. *L. canadensis* (L.) Dum. Cours. bot. cult. II (1802) 96; Chav. Monogr. 149; Fedtsch. and Fler. Fl. Evrop. Ross. III, 852; Maevsk. Fl. izd. 8, 451.—*Antirrhinum canadense* L. Sp. pl. (1753) 618.

Annual or biennial. Plant glabrous. Stem 25–60 cm long, erect or ascending, slender, with vegetative shoots. Leaves opposite or whorled, linear, 2–3 cm long, 1–2 mm broad. Flowers in slender, lax racemes. Pedicels elongated in fruit. Calyx lobes linear-lanceolate, pointed. Corolla lilac, 6 mm long (excluding spur); spur slender, about 6 mm long. Capsule globose, 3 mm in diameter, longer than or equaling calyx teeth. Seeds about 0.5 mm long, trigonous. July to August.



Cultivated and naturalized (Moscow Province). Native of North America (Virginia, Canada). Described from Virginia. Type in London.

46. *L. bipartita* (Vent.) Willd. Enum. pl. hort. Berol. II (1809) 640. —*Antirrhinum bipartitum* Vent. Descr. pl. nov. (1800) tab. 82; Chav. Monogr. 145; Fedtsch. and Fler. Fl. Evrop. Ross. III, 852; Hegi, Illustr. Fl. Mittel-Eur. VI, 23.

Annual. Plant glabrous. Stem (10)20–30 cm tall, with vegetative shoots. Leaves whorled, linear, flat, slender-acuminate, 2.5–5 cm long, 1.5–3 mm broad, with one prominent rib. Flowers in lax racemes, on long  
219 pedicels, 2–3 times as long as lanceolate bracts. Calyx glabrous; lobes linear-lanceolate, slender acuminate, 5 mm long, 1 mm broad. Corolla violet, with orange patch in throat, 12 mm long (excluding spur); upper lip deeply bipartite, lobes rounded; lobes of lower lip large, ovate; spur slender, curved, equaling corolla or slightly longer. Capsule globose, 4 mm long, shorter than calyx teeth. Seeds less than 0.5 mm long, spirally rugose. June to July.

Cultivated in gardens and naturalized (Moscow Province). *General distribution*: western Mediterranean Region. Type in Paris.

47. *L. corifolia* Desf. Choix de pl. ex Cor. Tourn. tab. 22 (1808) 32; Chav. Monogr. 153. —*L. cordifolia* Boiss. Fl. or. IV (1879) 379; Grossh. Fl. Kavk. III, 369. —*L. dschorochensis* C. Koch in Linnaea, XXII (1849) 718. —*L. corrugata* Karjag. ex Grossh. opred. rast. Kavk. (1949) 305.

Perennial. Plant glaucescent. Stems 15–40 cm tall, erect, 2–3, branched above, densely leafy below. Leaves linear-filiform, 1–4 cm long and 1 mm broad, semicylindrical, alternate. Flowers in panicles terminating stems. Bracts filiform, 2–3 mm long, exceeding pedicels. Pedicels 1–2 mm long. Calyx glandular-puberulent, lobes linear-lanceolate, acuminate, 2.5 mm long, about 1 mm broad. Corolla violet, 8–10 mm long (excluding spur); upper lip exceeding lower lip, incised up to middle into two narrow acuminate lobes; lobes of lower lip rounded, almost ovate; spur broadly conical, straight, 2–2.5 mm in diameter. Seeds sharply trigonous, tuberculate at angles. May.

On stony slopes in middle mountain zone.—*Caucasus*: southern Transcaucasia. *General distribution*: Asia Minor. Described from Tournefort's specimens from Asia Minor. Type in Paris.

48. *L. monspessulana* (L.) Mill. Gard. Dict. (1768) No. 9; Hegi, Illustr. Fl. Mittel-Eur. VI, 22. —*Antirrhinum monspesulanum* L. Sp. pl. (1762) 854. —*A. striatum* Lam. Fl. fr. II (1778) 343. —*Linaria striata* DC. Prodr. X (1846) 278; Ldb. Fl. Ross. III, 210, p.p.



Perennial. Plant glabrous. Stems 20–35 cm tall, ascending. Leaves whorled, flat, linear, acuminate, with one prominent rib, 1.5–4 cm long, 2–5 mm broad. Flowers in rather long lax inflorescence. Bracts linear-filiform, shorter than pedicels. Pedicels 3–4 mm long. Calyx lobes linear-lanceolate, acuminate, 2.5 mm long, about 1 mm broad. Corolla sky-blue or whitish, 7–10 mm long (excluding spur); upper lip exceeding lower lip, bifid; lobes of lower lip ovate, rounded, 2 mm broad; spur 2 cm long, straight, subobtusate. Capsule globose. Seeds trigonous, with prominent ribs and coarsely rugose at angles. July to August.

*European USSR*: Baltic Region (Latvia). *General distribution*: Atlantic Europe. Described from France. Type in London.

- 220 Section IV. *Diffusae* Benth. in Pflanzenfam. IV, 3 (1895) 59. —Annuals and perennials. Seeds oblong-reniform, compressed at inner margin and thickened at outer margin, rarely angular. Flowers often axillary or in panicles. Corolla white, sky-blue or yellow. Leaves whorled.

Species of this section are distributed in western Mediterranean Region. In the USSR, *L. reflexa* (L.) Desf. is found as weed in western Transcaucasia and, apparently, to this same section also belongs *L. Japonica* Miq., growing in the Soviet Far East and Japan.

49. *L. reflexa* (L.) Desf. Fl. atl. II (1800) 42; Boiss. Fl. or. IV, 386; Grossh. Fl. Kavk. III, 370; Kolak. Fl. Abkhaz. IV, 93.—*Antirrhinum reflexum* L. Sp. pl. (1762) 857.— *Ic.*: Sibth and Sm. Fl. gr., tab. 593, 74.

Annual. Plant glaucescent, glabrous. Stems procumbent, numerous, 10–30 cm long, branched. Lower leaves whorled, upper leaves alternate, obovate, 3-veined, 1–2 mm [cm] long, 5–7 mm broad. Flowers axillary. Pedicels long, reflexed in fruit, glabrous. Calyx glabrous, lobes linear-lanceolate, slender acuminate. Corolla sky-blue or white, with orange palate in throat, 10–11 mm long (excluding spur); upper lip much exceeding lower lip, deeply bilobed; lobes of lower lip broad; spur long, 12 mm long, 2 mm broad, slightly curved, acuminate. Capsule globose, 4 mm in diameter, shorter than calyx teeth. Seeds 1 mm long, oblong-reniform, narrowed at inner portion, rugose. June to July.

Weed.—*Caucasus*: introduced only in Sukhumi. *General distribution*: Mediterranean Region. Type in London.

50. *L. japonica* Miq. Ann. Mus. Bot. Lugd.-Bat. II (1865–1866) 115; Kom. and Alis. Oprod. rast. Dal'nevost. Kr. II, 918.

Perennial. Plant glabrous, glaucescent. Stems often numerous, ascending or partially ascending, branched, 15–20 cm tall. Leaves whorled, elliptic or oblong, rarely obovate, somewhat subobtusate or mucronate, 1.5–3 cm long, 0.5–1.5 cm broad, obscurely 3-veined. Inflorescence short, lax, about 3–5-veined [sic]. Pedicels 5–6 mm long. Bracts shorter than pedicels,

lanceolate. Calyx glabrous within and outside, lobes lanceolate or ovate, 2.5–4 mm long, 1.5–2.5 mm broad. Corolla 12–17 mm long, light yellow, with bright orange patch in throat; upper lip exceeding lower lip, with 2.5 mm deep sinus; lobes of lower lip large, rounded, 3 mm broad, middle lobe narrower; spur conical, 3.5–6 mm long. Capsule globose, 7 mm in diameter. Seeds 2.5 mm long, 1.5 mm broad, reniform, with thickened margin. August.

Stony southern slopes.—*Soviet Far East*: Sakhalin. *General distribution*: Japan. Described from Japan. Type in Leiden.

- 221 Subsection 1. *Cretacea* Klok. in Bot. zhurn. SSSR, XXIV, 1 (1949) 75; pro ser.—Perennials. Seeds elongated, flat, lunate, rugose. Corolla 5–8 mm long (excluding spur). Leaves whorled. Plant common in calcareous regions of European USSR and western Kazakhstan.

51. *L. cretacea* Fisch. ex Spreng. Syst. II (1825) 791; DC. Prodr. X, 285; Fl. Yugo-Vost. VI, 196; Maevsk. Fl. ed. 8, 452, in part.—*L. menisperma* Klok. in Bot. zhurn. XXXIV (1949) 70.

Perennial. Plant glabrous, glaucescent, with vegetative shoots at base. Stems 3–5, ascending, 10–25 cm tall, branched only above; branches short, spreading. Leaves fleshy, with obscure veins, opposite or in whorls of 3, cauline leaves broadly ovate, amplexicaul, mucronate; lower leaves 10 mm long and broad; middle 8 mm long, 7 mm broad; those in inflorescence orbicular-reniform. Flowers in short, lax inflorescences terminating branches. Bracts linear, acuminate, slightly exceeding pedicels. Pedicels 1–1.5 mm long. Calyx teeth narrow, linear-lanceolate, 2.5–3 mm long and 1 mm broad. Corolla yellow, 7–8 mm long; upper lip slightly exceeding the lower, bifid, with rounded lobes; lobes of lower lip ovate; spur 5 mm long. Not all capsules developing; globose, 3 mm in diameter. Seeds elongated, lunate, with very narrow fringe, rugose. June to July (Plate VIII, fig. 6).

On calcareous outcrops. *European USSR*: Lower Don (northeastern section); Trans-Volga Region, Lower Volga (north); *Western Siberia*: Upper Tobol (southwestern section); *Soviet Central Asia*: Aral-Caspian Region (northwest).

Endemic. Described from calcareous sediments of Middle Don. Type in Leningrad.

52. *L. creticola* Kuprian. in Tr. Bot. inst. Akad. Nauk SSSR, I, 9 (1950) 63, Plate II, fig. 5.—*L. cretacea* auct. fl. ross. non Fisch.

Perennial. Plant glabrous, glaucescent, with vegetative shoots at base. Stems 1–5, ascending, 10–15(20) cm tall, branched from base, with slender, spreading branches. Leaves fleshy, with obscure veins, opposite or in whorls of 3, cauline leaves broadly lanceolate to lanceolate, gradually

tapering; lower leaves 8–10 mm long, 4–5 mm broad, middle 6–7 mm long, 3 mm broad; those in inflorescence narrowly lanceolate. Flowers in short lax inflorescences terminating branches. Bracts linear, acuminate, slightly longer than pedicels. Pedicels 1–5 mm long. Calyx teeth linear, acuminate, 1.5–2 mm long, 1 mm broad. Corolla yellow, 7–8 mm long (excluding spur); upper lip almost equaling lower, bifid, with rounded lobes; lobes of lower lip ovate, 2 mm broad, middle lobe almost equaling lateral ones; spur 5 mm long. Capsule 3 mm in diameter. Seeds elongated, lunate, with very narrow fringe, rugose, 1.5 mm long. June to August (Plate VIII, fig. 5).

On marly calcareous deposits.—*European USSR*: Volga-Don (Starobelsk Region). Endemic. Described from Starobelsk Region. Type in Leningrad.

53. *L. macrophylla* Kuprian. in Tr. Bot. inst. Akad. Nauk SSSR, I, 9 (1950) 63.—*L. cretacea* auct. fl. ross.

Perennial. Plant glaucescent-green, glabrous. Stems 3–4, ascending, rarely solitary, 20–30(40) cm tall, branched above; branches slender, long, patent. Leaves opposite or in whorls of 3 orbicular-reniform, mucronate, amplexicaul, fleshy, obscurely veined; lower leaves 2 cm long and broad; middle 1 cm long and broad; those in inflorescence orbicular-reniform with slightly tapering apex. Inflorescence paniculate, 5–10 cm long. Flowers borne singly or in pairs, often in threes. Bracts linear. Pedicels 1–2(3) mm long. Calyx lobes narrow, linear-lanceolate, 2 mm long. Corolla similar to the preceding species. Capsule globose, 3 mm in diameter, shorter than calyx teeth. Seeds as in the preceding species. June to July (Plate VIII, fig. 4).

On calcareous deposits.—*Soviet Central Asia*: Aral-Caspian Region (on the left bank of the Emba). Endemic. Described from the left bank of Emba River. Type in Leningrad.

Section 5. *Arvenses* (Benth.) Wettst. in Pflanzenfam. IV, 3 (1895) 59; Benth. in DC. Prodr. X.—Annuals. Seeds discoid with slightly serrated or fringed margin, smooth or tuberculate in center. Inflorescence mostly capitate or compact, elongated. Corolla small, white, sky-blue, yellow or purple-violet. Leaves whorled.

54. *L. arvensis* (L.) Desf. Fl. atl. (1800) 45; DC. Prodr. X, 280; Szaf., Kulcz. Pavl. Rosl. Polsk. 496; Fedtsch. and Fler. Fl. Evrop. Ross. III, 850; Hegi, Illustr. Fl. Mittel-Eur. VI, 23.—*Antirrhinum arvense* L. Sp. pl. (1762) 855.

Annual. Stems 10–45 cm tall, erect, branched, single, rarely 3–5, sparsely leafy. Leaves linear, 1.5–3.5 cm long, 1–2 mm broad, generally pointed, whorled. Flowers in capitate inflorescence, much elongated in



fruit. Bracts linear, glandular-hairy, like inflorescence axis, pedicels and calyx. Calyx lobes linear, 4 mm long. Corolla pale blue, 5 mm long (including spur). Capsule 5 mm in diameter. Seeds flat, discoid with regular membranous margin, smooth in center (minutely tuberculate under high magnification). March to April.

In fields, sandy places.—*European USSR*: possibly grows along Upper Dnieper (West). *General distribution*: Central and Southern Europe, Mediterranean Region, Balkan States. Described from cultivated specimens. Type in London.

- 223 55. *L. turcomanica* Kuprian. in Tr. Bot. inst. Akad. Nauk SSSR, I, 9 (1950)69.—*L. simplex* O. and B. Fedtsch. Perech. rast. Turkest. 5 (1913) 81, non DC.

Biennial. Plant glabrous, slender. Stems 10–30 cm tall, ascending, sparsely leafy. Leaves linear, 1.5–2 cm long, 1–2 mm broad, subobtusely, opposite or in whorls of 3. Inflorescence capitate, elongated in fruit. Bracts linear 2.5–3 mm long, exceeding pedicels, pedicels elongated in fruit. Inflorescence axis, pedicels, and calyx glandular-hairy. Calyx lobes linear, subobtusely, 3–4 mm long. Corolla yellow, with blue veins, 4 mm long (excluding spur); spur slender, curved, 3 mm long; upper lip deeply lobed. Capsule globose, 6 mm in diameter. Seeds 2.5 mm in diameter, discoid, with broad, membranous, dentate margin, entirely smooth in center. April.

On rubbly slopes of foothills.—*Soviet Central Asia*: mountainous Turkmenia (Krasnovodsk, Bolshoy Balkhan Mts., Kyzyl-Arvat, Firyuza). *General distribution*: Iran. Described from Kopet-Dag. Type in Leningrad.

*Note*. This species is similar to *L. simplex* (Willd.) DC. from which it is distinguished mainly by the absence of tuberculation on the seeds.

The new specimens collected by V.V. Nikitin included a few with tuberculate seeds from the mountainous regions of Kopet-Dag, near the Iranian border, while plants with smooth seeds grow mainly on the Kopet-Dag foothills and Bolshoy Balkhan Mts.

56. *L. simplex* (Willd.) DC. Fl. fr. III (1815) 588; M.B. taur.-cauc. II, 74; Ldb. Fl. Ross. III, 210; Fedtsch. and Fler. Fl. Evrop. Ross., 850; Grossh. Fl. Kavk. III, 371; Hegi, Illustr. Fl. Mittel-Eur. VI, 23.—*Antirrhinum arvense* β. L. Sp. pl. II (1762) 855.—*A. simplex* Willd. Sp. pl. III (1800) 243.—*Linaria arvensis* β. Desf. Fl. atl. (1800) 45; Chav. Monogr. 157.

Annual. Stems 3–5, 10–45 cm tall, ascending, simple, sparsely leafy. Leaves linear, 1.5–3.5 cm long, 1–2 mm broad, subobtusely or acuminate, more or less opposite or in whorls of 3. Inflorescence capitate, much elongated in fruit. Bracts linear, 3–5 mm long, exceeding pedicels, accrescent. Inflorescence axis, bracts, pedicels and calyx glandular-hairy. Calyx lobes



linear, 4 mm long. Corolla yellow, blue-veined, 3 mm long (excluding spur); spur curved, 3–3.5 mm long; upper lip deeply bilobed. Capsule globose, 6 mm in diameter. Seeds 2 mm in diameter, discoid, with broad, membranous, slightly dentate margin, sharply tuberculate in center. April.

- 224 In rocky places and wastelands.—*European USSR*: Crimea; *Caucasus*. Ciscaucasia, Dagestan, eastern and southern Transcaucasia. *General distribution*: Southern Europe, Mediterranean Region, Balkan States. Described from Southern Europe. Type in Berlin.

57. *L. micrantha* (Cav.) Hoffmg. and Link, Fl. Port. I (1809) 258; Spreng. Syst. II, 794; Chav. Monogr. 156; Ldb. Fl. Ross. III, 210; Grossh. Fl. Kavk. III, 370.—*Antirrhinum micranthum* Cav. Ic. I (1791) 51; fig. 69.—*L. simplex* M. Pop. in Tr. Penz. obsch. lyub. estestv. (1916) 9, non DC.

Annual. Stems 2–4, 10–20 cm tall, ascending, simple, with several vegetative shoots at base, densely leafy. Lower leaves in whorls of 3, upper alternate, lanceolate, 1–1.5 cm long, 3–4 mm broad, mucronate. Inflorescences capitate, somewhat elongated in fruit. Bracts lanceolate, lower 4(5) mm long, much exceeding pedicels. Inflorescence axis, bracts, pedicels and calyx sparsely glandular-pubescent. Calyx lobes lanceolate, almost equaling corolla tube, 3 mm long and 1–1.5 mm broad. Corolla sky-blue, distinctly blue-veined, 5 mm long with spur; spur short, broadly conical, much shorter than corolla. Capsule globose, 5 mm in diameter. Seeds 1.5 mm in diameter, with smooth margin, sharply tuberculate in center. March to April.

On foothills.—*Caucasus*: eastern Transcaucasia (Baku region); *Soviet Central Asia*: Pamiro-Alai (Kugitang and Mogol-Tau). *General distribution*: Mediterranean Region (west and east). Described from Spain. Type in Paris.

58. *L. pelisseriana* (L.) DC. Fl. fr. III (1815) 589; Chav. Monogr. 154; Ldb. Fl. Ross. III, 210; Boiss. Fl. or. IV, 375; Grossh. Fl. Kavk. III, 370.—*Antirrhinum pelisserianum* L. Sp. pl. II (1762) 885.—*Ik.*: Fl. gr. tab. 591.

Annual. Stems 20–35 cm tall, ascending, poorly branched, with numerous vegetative shoots. Leaves narrowly linear, alternate, 2–3 cm long, 1 mm broad. Inflorescence elongated, compact. Bracts linear, glabrous. Pedicels 3–5 mm long, glabrous. Calyx glabrous, with slender acuminate linear or linear-lanceolate lobes. Corolla purplish violet, 10 mm long (excluding spur); upper lip deeply bifid, much exceeding lower lip; spur 10 mm long, slender acuminate, straight. Capsule globose. Seeds planoconvex, with membranous fringed margin, sharply tuberculate in center.

*Caucasus*: Transcaucasia (Ledebur). *General distribution*: Southern Europe, Mediterranean Region (west and east). Described from France. Type in London.

Section 6. *Minutiflorae* Benth. in DC. Prodr. X (1846) 280.—Annuals. Seeds elongated, trigonous, rugose, about 1 mm long. Inflorescence capitate. Corolla 5 mm long (excluding spur), white. Leaves whorled. Ephemeral plants.

225 This section includes only *L. albifrons* (Sibth. and Sm.) Spreng, described from the Rhodes Island. It is also found in North Africa and Iran. Its most interesting habitat is the outskirts of Baku, where it was discovered by Meyer and described under the name *L. minutiflora*. Subsequently, it has not been collected in the Caucasus.

59. *L. albifrons* (Sibth. and Sm.) Spreng. Syst. II (1825) 793; Boiss. Fl. or. IV. 382; Grossh. Fl. Kavk. III, 370.—*Antirrhinum albifrons* Sibth. in Sibth. and Sm. Ic. Fl. gr. (1826) tab. 588.—*Linaria minutiflora* C.A. Mey. Verz. Pflanz. Cauc. Casp. Meer (1831) 109; Ldb. Fl. Ross. III, 211; Chav. Monogr. 156.—*Exs.*: Bornmüller, Iter Pers.-turc. No. 549.

Annual. Plant glabrous, glaucescent. Stems 3–5, 5–10(20) cm tall, ascending. Leaves whorled, fleshy, lower leaves ovate-lanceolate or oblong-lanceolate, 6–10 mm long, 3–5 mm broad. Inflorescence capitate, elongated in fruit. Bracts exceeding pedicels, lanceolate, glabrous. Calyx glabrous, large, almost equaling corolla, lobes broad, lanceolate, fleshy. Corolla 5 mm (excluding spur), yellowish in throat, corolla tube light violet; upper lip much exceeding lower, deeply bifid; spur very short, straight, conical, 1.5 mm long. Capsule oblong, 5 mm long. Seeds less than 1 mm long, oblong, trigonous, angular, rugose, with minutely tuberculate surface. March.

On dry slopes.—*Caucasus*: eastern Transcaucasia. *General distribution*: eastern Mediterranean Region. Iran. Described from the island of Rhodes. Type in Berlin.

### Genus 1329. *ANTIRRHINUM*<sup>1, 2</sup> L.

L. Sp. pl. (1753) 612; Chav. Monogr. (1833) 79.

Corolla mouth closed, tube saccate at base without spur. Capsule oblique ovoid, bilocular, abaxial locule dehiscent by two apical pores, theoadaxial by one. Seeds ribbed or reticulate-rugose.

The genus includes about 40 species, distributed in America and Mediterranean countries of Asia.

<sup>1</sup> Treatment by L.A. Kuprianova.

<sup>2</sup> From the Greek *anti*—negative, and *rhinos*—nose; indicating the absence of a spur in corolla.

1. Uppermost leaves longer than flowers; seeds single-ribbed; calyx lobes exceeding corolla and capsule ..... 1. *A. orontium* L.
- + Uppermost leaves much shorter than flowers; seeds reticulate-rugose; calyx lobes not exceeding corolla and capsule ..... 2. *A. majus* L.

226 1. *A. orontium* L. Sp. pl. (1753) 617; Ldb. Fl. Ross. III, 213; Boiss. Fl. or. IV, 385; Schmalh. Fl. II, 261; Fedtsch. and Fler. Fl. Evrop. Ross. 853; Hegi, Illustr. Fl. Mittel-Eur. VI, 20, tab. 236, f. 2; Szaf., Kulcz., Pawl. Rosl. Pol. 497.

Annual. Stem 15–40 cm tall, glandular-hairy, branched above. Leaves lanceolate or linear, subsessile, upper leaves exceeding flowers. Flowers in sparse raceme. Calyx lobes linear, 15 mm long and 1.5 mm broad, pubescent. Corolla 10–12 mm long, light red. Capsule oblique-ovoid, glandular-pubescent. Seeds ovoid, convex and single ribbed outside, inner side concave, margin recurved dentate. July to September.

Weeds in fields.—*European USSR*: Black Sea Region, Crimea. *General distribution*: Atlantic, Central and Southern Europe, Mediterranean Region, India-Himalayas. Described from Western Europe. Type in London.

2. *A. majus* L. Sp. pl. (1753) 617; Ldb. Fl. Ross. III, 214; Boiss. Fl. or. IV, 385; Schmalh. Fl. II, 261; Fedtsch. and Fler. Fl. Evrop. Ross. 853.—*Ic.*: Hegi, Illustr. Fl. Mittel-Eur. VI, 19, tab. 236, f. 1.

Annual. Stem 30–70 cm tall, branched, glandular-hairy above. Leaves lanceolate; upper smaller. Flowers in rather dense raceme, large, on thick pedicels. Calyx glandular-hairy, lobes ovate, shorter than corolla and capsule. Corolla light purple or whitish, 20–30 mm long. Capsule glandular-hairy, 12–17 mm long. Seeds reticulate-rugose. June to September.

Cultivated in gardens; sometimes naturalized.—*General distribution*: Southern Europe, Mediterranean Region. Described from Southern Europe. Type in London.

### Genus 1330. *CHAENORRHINUM*<sup>1, 2</sup> Lge.

Lge. in Willk. and Lange Prodr. Fl. Hisp. II (1870) 577.

Corolla throat open. Capsule dehiscing apically by tridentate pores or irregular slit. Seeds oblong-ovoid, ribbed or prismatic, ribs tuberculate. Annuals with entire, opposite leaves, narrowed into petioles, and axillary flowers.

<sup>1</sup> Treatment by L.A. Kuprianova.

<sup>2</sup> From the Greek *chainein*—open, *rhinos*—nose. Name indicating open corolla throat of flowers.

The genus includes about 20 species, distributed outside the USSR in Western Europe, Mediterranean Region, Asia Minor and Iran. Of the species in the flora of the USSR, *C. spicatum* Korov, and *C. rhytidospermum* (Fisch. and Mey.) Kuprian. approach the genus *Schweinfurthia* A. Br. in some features.

- 227 1. Leaves linear, subobtusate; capsule oblong, with thin membranous pericarp, obtuse, dehiscing by tridentate pores; seeds ovoid .....2.  
 + Leaves lanceolate-linear or ovate; capsule globose, with thick pericarp and spiny mucro at apex, dehiscing by irregular lateral slit; seeds prismatic, ribbed, ribs tuberculate .....3.  
 2. Seeds brown, 0.4 mm long, almost smooth or sparsely denticulate on ribs; capsule 5–6 mm long; [leaves] 2–4 cm long; plant a weed .....  
 ..... 1. *C. viscidum* (Moench) Simk.  
 + Seeds dark, 0.6 mm long, sharply and closely denticulate on ribs; capsule 4–4.5 mm long; leaves 1–2 cm long; plant common on calcareous outcrops ..... 2. *C. klokovii* Kotov.  
 3. Leaves ovate, with 3 somewhat thick prominent veins; petiole distinct; flowers sessile, calyx nonciliate, corolla pinkish lilac .....  
 ..... 3. *C. spicatum* Korov.  
 + Leaves linear-lanceolate, gradually narrowed into petiole, midrib distinct, lateral veins obscure; flowers pedicellate; calyx white-ciliate at base and along teeth margin, corolla sky-blue .....  
 ..... 4. *C. rhytidospermum* (Fisch. and Mey.) Kuprian.

1. *C. viscidum* (Moench.) Simk. in Urb. and Graeb. Festschr. Aschers. (1904) 234.—*Linaria viscida* Moench. Meth. pl. (1794) 525.—*L. minor* Ldb. Fl. Ross. III (1847–1849) 213; Schmalh. Fl. II. 265; Syreistsch. III. Fl. Mosk. gub. III, 135; Maevsk. Fl. 451.—*Exs.*: GRF, Nos. 472, 3788, Fl. pol. Exs. No. 662.

Annual. Plants glandular-hairy. Stem 10–30 cm tall, branched from base. Leaves oblong-lanceolate, subobtusate, gradually narrowed into a short petiole; lower leaves opposite, upper alternate. Flowers axillary, on 8–10 mm long pedicels. Bracts half as long as pedicels. Calyx lobes subobtusate, 3–5(6) mm long and 1 mm broad. Corolla light violet, with yellowish patch in throat, 6 mm long; upper lip sinuate, lower with equal lobes. Capsule 5–6 mm long and 4 mm broad, with thin pericarp, glandular-hairy. Seeds ovoid, 0.4–0.5 mm long, ribs almost smooth. July to August.

In fields, along road embankments, on limestone.—*European USSR*: Dvina-Pechora (Vologda), Baltic States, Ladoga-Ilmen, Upper Dnieper, Upper Volga, Volga-Don, Upper Dniester, Middle Dnieper, Black Sea Region, Crimea; *Caucasus*: Ciscaucasia, western Transcaucasia. *General distribution*: Central Europe. Described from Central Europe. Type in Berlin.



- 228 *Note.* It is possible that, the Baltic race of this species (*C. minus* (L.) Simk.), which is recognized as a distinct species by Simonkai, grows in the northwestern region of European USSR (Baltic States, Ladoga-Ilmen), while the Central European race *C. viscidum* is widely distributed in southern and southeastern regions.

2. *C. klovovii* Kotov. in Bot. zhurn. Akad. Nauk URSR, XI, 4 (1954) 77.—*C. minus* var. *creticola* Schir. ex Vozn. rosl. (1950) 378.

Annual. Similar to preceding species. Leaves smaller, extended linear, 1–2 cm long and 1–2 mm broad. Capsule oblong, 4–4.5 mm long. Seeds ovoid, somewhat dark-colored, 0.6 mm long, sharply and closely denticulate along ribs. June to August.

On calcareous deposits along Don and Donets.—*European USSR*: Volga-Don, Lower Don. Endemic. Described from calcareous banks of Donets. Type in Kiev.

3. *C. spicatum* Korov. in Bot. mat. Gerb. Gl. bot. sada, V (1924) 180; in Tr. Turkest. univ. 5, 58.

Annual. Plant glandular-hairy. Stem 10–25 cm tall, branched from base. Lower leaves opposite, upper alternate, ovate, up to 3.5 cm long (including petiole) and 1–1.5 cm broad. Petiole 2 cm, veins sharply prominent. Flowers sessile or pedicels not exceeding 0.5 mm. Calyx lobes twice as long as capsule, lanceolate-linear, distinctly 3-veined, slightly narrowed toward base, glandular-puberulent. Corolla 11–12 mm long, tube pale, lips pinkish lilac, upper lip bifid up to middle; lobes of lower lip almost equal, rounded. Capsule globose, subulate-acuminate, about 6 mm diameter, puberulent, laterally dehiscent. Seeds prismatic, ribbed, sharply tuberculate, about 1 mm long. April.

On stony alluvial deposits of monadnocks, in desert zone. *Soviet Central Asia*: mountainous Turkmenia, Kara Kum, Kyzyl Kum, Syr Darya (Fergana). *General distribution*: Afghanistan (northwest). Described from Tedzhen. Type in Tashkent.

*Note.* Specimens from Fergana are distinguished by smaller capsules, and sepals equaling the capsules. Further study of the Fergana specimens could possibly help in separating them into an independent species.

4. *C. rytidospermum* (Fisch. and Mey.) Kuprian. comb. nov.—*C. persicum* auct. non Chav.: O. and B. Fedtsch. Perech. rast. Turkest. 5 (1913) 84; Grossh. Fl. Kavk. III, 373.—*Linaria rytidosperma* Boiss. Diagn. pl. or. I, 4 (1844) 73.—*L. persica* Boiss. Fl. or. IV (1879) 384, p.p.—*Antirrhinum rytidospermum* Fisch. and Mey. Ind. sem. II (1835) 27.

Annual. Plant glandular-puberulent. Stem erect, 10–15 cm tall, branched. Lower leaves opposite, lanceolate, upper alternate,

- 229 linear-lanceolate or linear, gradually narrowed into petiole, 2–3 cm long (including petiole), 27 mm[2.7 mm] broad, veins obscure, midrib more distinct. Flowers axillary. Pedicels 2–5 mm long. Calyx lobes twice as long as capsule, with 3 prominent veins, glandular, ciliate at base along teeth margin. Corolla 12–13 mm long (excluding spur), with pale blue and bright sky-blue lips; upper lip cleft up to middle, lower lip with 3 long ligulate lobes, middle lobe narrower; spur 8 mm long, straight, long pointed. Capsule 6–7 mm in diameter, globose, conically pointed, dehiscing laterally, not apically. Seeds prismatic, with wavy longitudinal outgrowths, 1.5 mm long. May.

On rubbly and stony mountain slopes.—*Caucasus*: southern Transcaucasia, Talysh; *Soviet Central Asia*: Aral-Caspian Region (rare). *General distribution*: Iran (northwest). Described from Transcaucasia. Type in Leningrad.

*Note*. Chavannes, in the description of *L. persica*, notes the presence of a yellow corolla among the plants being described, citing at the same time Michaux from Iran. For this reason we must refrain from giving our plants the name proposed by Chavannes, since all the specimens from the Caucasus and Soviet Central Asia seen by us have a sky-blue corolla. They are identical to typical specimens of the species described by Fischer and Meyer.

Tribe 2. CHELONEAE Benth. in DC Prodr. X (1846) 298.—Corolla campanulate or tubular, without pouch or spur at base. Anthers unilocular. Fruit a capsule, dehiscing by valves. Leaves opposite, or upper leaves alternate.

### Genus 1331. *SCROPHULARIA* L.<sup>1, 2</sup>

L. Sp. pl. (1753) 619; Stiefelhag. in Bot. Jahrbüch. 44 B (1910) 406.—*Ceramanthe* Dum. Not. Scrophul. (1834) 7.—*Tomiophyllum* Fourr. in Ann. Soc. Linn. Lyon N.S. XVII (1869) 125.—*Venilia* Fourr. l.c.

- 230 Calyx deeply 5-fid or 5-partite, persistent in fruit, glandular-pubescent or glabrous. Corolla brown, reddish brown, purple or yellow, glabrous, rarely diffusely glandular-pubescent (*S. atropatana* Grossh., *S. czapandaghii* B. Fedtsch., *S. nikitinii* Gorschk.) inflated or spherical-urceolate, with 5-lobed, almost bilabiate, oblique short limb; upper lip bilobed, with orbicular or oblong-orbicular, generally straight lobes narrowed at base, exceeding lateral, flat and broad, erect or spreading lobes of lower lip; middle lobe of lower lip reflexed; corolla rarely with equal

<sup>1</sup> Treatment by S.G. Gorschkova.

<sup>2</sup> From the Latin *scrophula*—scrofula. Used as a remedy for scrofula in medicine.

lobes. Stamens 4, inserted at base of tube, exserted or included in corolla tube, two anterior stamens longer than or sometimes equaling two posterior ones, declinate; the fifth stamen between lobes at base of upper corolla lip, represented by fleshy or scaly staminode, highly variable in form, rarely absent; anthers unilocular. Ovary superior, bilocular, glabrous, sometimes pubescent, with base surrounded by fleshy disk; style filiform stigma small. Fruit a bilocular many-seeded capsule, glabrous, sometimes pubescent, dehiscent by two valves; valves entire or bifid above. Seeds ellipsoid, ovoid or oblong, dark brown, almost black, longitudinally ribbed and transversely rugose. Flowers numerous, bisexual, zygomorphic, mostly on slender pedicels, 1–3 or 3–7(9) together in cymes on axillary peduncles and forming pyramidal, paniculate, very rarely capitate or ovoid inflorescence. Bracts lanceolate, linear or setaceous. Annual, biennial or perennial, herbs, rarely semishrubs, glabrous or glandular-pubescent. Leaves opposite, rarely whorled, entire, pinnate, bi- or multi-pinnatisect with veins beneath distinctly anastomotic or not.

The genus includes about 310 species, distributed in subtropical regions of the northern hemisphere, especially in countries of the Mediterranean Region.

1. Plants generally densely leafy; lower leaves (2.6)3.5–15(17) cm long, (3)6–11(13) cm broad, entire, with veins distinctly anastomosed underneath [Section I. *Anastomosanthus* Stiefelbag.] ..... 2.
- + Plants generally sparsely leafy; lower leaves 2–8(11) cm long and 1–4(7.5) cm broad, with lamina poorly developed, pinnate or mostly bipinnate or multipinnatisect, very rarely leaves entire, coarsely crenate, almost incised or incise-dentate, veins not anastomosed or if so, only in isolated leaves [Section II. *Tomiohyllum* Benth.] ..... 29.
2. Corolla lobes subequal; staminode absent ..... 3.
- + Lobes of upper corolla lip 2–4 times as long as lateral lobes of lower lip; staminode variable in form ..... 11.
3. Perennials; leaves lanceolate or elliptical-cordate, 2–6 times as long as broad ..... 4.
- 231 + Annuals or biennials; leaves orbicular-cordate, cordate-ovate or ovate, slightly longer than or as long as broad ..... 7.
4. Stem glabrous; leaves lanceolate, 15–17 cm long, 2.7 cm broad, 6 in whorl; flowers numerous, 3–5 in each cyme, cymes 6 in a verticil forming leafless oblong inflorescence; calyx glandular-pubescent, lobes elliptical or orbicular-elliptical ..... 1. *S. verticillata* Gontsch. and Grig.



- + Stem pubescent or glabrous or petioles, pedicels and calyx covered with crystalline salt grains; leaves elliptic-cordate, oblong or oblong-lanceolate, glabrous or pubescent on both surfaces or only beneath; flowers 1-5(8) in each cyme ..... 5.
5. Plant 90-110 cm tall, densely glandular-pubescent (except corolla, ovary and capsule); stem 4-angled; leaves elliptic-cordate, 6-11(17) cm long, 3.5-4(13) cm broad, margin coarsely, irregularly dentate, with 4.5-6 cm long petioles; pedicels 3-9 mm long; corolla 5-6 mm long; calyx densely glandular-pubescent, deeply parted almost to base, equaling or slightly shorter than corolla, with lanceolate-linear, subobtuse lobes; capsule globose-conical, slightly exceeding or equaling calyx ..... 4. *S. tadshicorum* Gontsch.
- + Plants up to 60 cm tall, stem cylindrical, glabrous, pubescent or covered with crystalline salt grains; leaves oblong-lanceolate or oblong, entire or sharply serrulate; upper leaves sometimes coarsely dentate; corolla 4-4.5 mm long; calyx glabrous, half as long as corolla, with triangular-ovate or elliptical lobes; capsule globose or globose-ovoid, 2-3 times as long as calyx ..... 6.
6. Stem glabrous or covered with scattered white hairs; leaves oblong-lanceolate, 7-11 cm long, 3.3-4 cm broad, acute, margin sharply serrate, with 3 mm long petioles, glabrous on upper surface, sparsely pubescent beneath and along veins; pedicels 2-5 times as long as corolla; flowers few in 4-9 cm broad lateral cymes; calyx lobes triangular-ovate, corolla smooth; filaments glabrous ..... 2. *S. lateriflora* Trautv.
- + Stem, petioles, pedicels and calyx densely covered with crystalline salt grains; leaves oblong-elliptical or oblong, 2.6-3.2 cm long, 1.5 cm broad, smooth, subobtuse, entire or upper leaves coarsely dentate, petioles 2 cm long; pedicels 1/5 as long as corolla; flowers in terminal 0.6-0.8 cm broad inflorescence; corolla glandular-pubescent; calyx lobes elliptical; filaments glandular-pubescent ..... 3. *S. nikitinii* Gorschk.
- 232 7. Corolla dull pink, calyx glabrous; plant glandular-tomentose; leaves orbicular-cordate, 7-9 cm long, 7-11(13) cm broad, cuneate at base; lower leaves with 14-16 cm long petioles ..... 5. *S. kotschyana* Benth.
- + Corolla yellow or greenish yellow; calyx glandular-pubescent .... 8.
8. Inflorescence dense, ovoid, oblong or almost semiglobose, 0.5-2.5 cm long, 1.5-3 cm broad; plant white-villous; leaves cordate-orbicular, 2.5 cm long, 3-5.5 cm broad .... 6. *S. chrysanthia* Jaub. and Spach.
- + Inflorescences paniculate, lax, pyramidal, 6-21 cm long, 5-6 cm broad ..... 9.



9. Plant up to 50 cm tall, biennial, glabrous or occasionally scattered glandular-pubescent in upper part; leaves cauline, broadly triangular-ovate, 1–5 cm long, 1–5.5 cm broad; calyx half as long as corolla ..... 7. *S. lunariifolia* Boiss and Bal.
- + Plants 60–100 cm tall, annuals or biennials, densely glandular-pubescent; calyx slightly shorter than corolla ..... 10.
10. Leaf margin obscurely dentate; flowers numerous; corolla greenish yellow; calyx lobes obtuse; ovary and capsule glandular-pubescent ..... 8. *S. hyrcana* Grossh.
- + Leaf margin doubly dentate; flowers few; corolla yellowish green; calyx lobes subacute; ovary and capsule glabrous ..... 9. *S. vernalis* L.
11. Inflorescence densely leafy throughout ..... 12.
- + Inflorescence leafless or leafy only at base ..... 15.
12. Plants perennial or sometimes biennial ..... 13.
- + Plants annual ..... 14.
13. Leaves broadly cordate or broadly cordate-ovate, acute dentate-lobed or doubly incise-dentate; corolla brownish green, twice as long as calyx, upper lips with lobes three times as long as lateral lobes of lower lip; stamens included in corolla; staminode reniform, twice as broad as long ..... 12. *S. divaricata* Ldb.
- + Leaves broadly ovate or ovate-lanceolate, obtuse, coarsely and shallowly doubly dentate; corolla yellowish green, 2.5 times as long as calyx; lobes of upper lip twice as long as lateral lobes of lower lip; stamens almost exserted; staminode ovate, suborbicular, as long as broad ..... 14. *S. mollis* Somm. and Lev.
- 233 14. Leaves ovate-cordate, acute, coarsely dentate; pedicels 2–3 times as long as calyx; flowers in sparse panicles; calyx lobes lanceolate, acute, margins not fringed; corolla dark blood-red; lobes of upper lip 4 times as long as lateral lobes of lower lip; stamens included in corolla; staminodes orbicular-ovate, as long as broad; capsule 2–3 times as long as calyx ..... 15. *S. peregrina* L.
- + Leaves ovate-oblong, subacute, doubly dentate-serrate or sometimes incised, lower leaves resembling rosette; pedicels 1/4–1/2 as long as calyx; inflorescence narrow, pyramidal, 2.5–17(30) cm long, 2–3 cm broad, sometimes starting from base; calyx lobes orbicular, obtuse, with broad, white-scarious, fimbriate margin; corolla purple, lobes of upper lip twice as long as lateral lobes of lower lip; stamens slightly exserted; staminode reniform 1/3 as long as broad, emarginate; capsule 1.5–2 times as long as calyx ..... 11. *S. ilwensis* C. Koch.
15. Stamens exserted from corolla; staminode elliptical, twice as long as broad; corolla 4–4.5 mm long, lobes of upper lip almost equaling lateral lobes of lower lip ..... 18. *S. heucheriiflora* Schrenk.

- + Stamens included in corolla or barely exerted, staminode not as described above; corolla 0.5–1 cm long, lobes of upper lip 2–3.5 times as long as lateral lobes of lower lip ..... 16.
16. Calyx lobes lanceolate, broadly lanceolate or oblong-ovate, acute or subacute, margin slightly or not fimbriate ..... 17.
- + Calyx lobes orbicular or ovate-lanceolate, obtuse or subobtusate, margin narrowly or broadly white-scarious ..... 19.
17. Leaves broadly ovate or suborbicular, subacute, with 4–6 cm long petioles; calyx  $2/3$  as long as corolla; stamens included; staminode obovate or orbicular, as long as broad; ovary glandular-puberulent; capsule subglabrous when mature, equaling or slightly exceeding calyx ..... 19. *S. altaica* Murr.
- + Leaves ovate or cordate-ovate, with 0.5–2.5 cm long petioles, acute; calyx  $2/5$ – $1/2$  as long as corolla; stamens exerted; staminode linear or obovate, 1.25 or 5 times as long as broad; ovary glabrous; capsule glabrous, 2–2.5 times as long as calyx ..... 18.
18. Leaves cordate-ovate, floral leaves and bracts sessile, oblong-ovate; flowers on short, 1–2.5 mm long pedicels, cymes sessile or with 2 mm long peduncles; inflorescence compact, 17 cm long, 1–2.5 cm broad; calyx lobes ovate-oblong, subobtusate; lobes of upper corolla lip 2–3 times as long as lateral lobes of lower lip; staminode linear, 5 times as long as broad ..... 20. *S. mandshurica* Maxim.
- 234 + Leaves ovate or oblong-ovate; floral leaves lanceolate, with 2 mm long petioles; bracts linear; flowers on 2 cm long pedicels, cymes with 4(7) cm long peduncles; inflorescence broadly paniculate, 12–31 cm long, 10–15 cm broad; calyx lobes lanceolate, acute; lobes of upper corolla lip 3.5 times as long as lateral lobes of lower lip; staminode obovate, 1.25 times as long as broad ..... 21. *S. maximowiczii* Gorschk.
19. Plant glandular throughout, sometimes also with isolated stellate hairs; leaves obovate-oblong, subacute, closely dentate, sessile or subsessile, amplexicaul; flowers sessile or with 2.5 mm long pedicels; calyx glabrous or glandular-pubescent in lower part; stamens included in corolla; staminode oblong, twice as long as broad ..... 10. *S. amplexicaulis* Benth.
- + Plants glandular, sometimes also with simple hairs, very rarely only with simple hairs or glabrous; leaves petiolate, not amplexicaul . 20.
20. Leaves hastate or broadly ovate, acute often gradually tapering toward apex, coarsely dentate, with 1–2.5 cm long petioles; lobes of upper corolla lip not narrowed at base, twice as long as lateral lobes of lower lip; staminode obdeltoid or oblong-obovate, as long as broad ..... 16. *S. chlorantha* Kotschy and Boiss.

- + Leaves elliptical or oblong-ovate not hastate; lobes of upper corolla lip generally twice, rarely 3–4 times as long as lateral lobes of lower lip (*S. macrobotrys* Ldb.), staminode not as above ..... 21.
- 21. Plants with fleshy, bulbous rootstock ..... 22.
- + Plants with nonbulbous rootstock ..... 24.
- 22. Inflorescence dense, narrow, spicate, 9–40 cm long, 1.5–3 cm broad, almost leafless; calyx glabrous, 1/3 as long as corolla; lobes of upper corolla lip twice as long as lateral lobes of lower lip; stamens included in corolla; staminode obovate-spatulate or orbicular, 1.25 times as long as broad ..... 25. *S. oldhami* Oliver.
- 235 + Inflorescence generally lax ..... 23.
- 23. Plant glabrous, sometimes sparsely glandular-pubescent above; calyx 1/3 as long as corolla, glabrous; lobes of upper corolla lip twice as long as lateral lobes of lower lip; staminode obreniform, twice as broad as long; capsule broadly ovoid, 3–4 times as long as calyx ..... 24. *S. nodosa* L.
- + Plant villous; calyx 2/5 as long as corolla, covered with simple hairs; lobes of upper corolla lip 3–4 times as long as lateral lobes of lower lip; staminode obovate-orbicular, as broad as long; capsule ovoid-conical, twice as long as calyx ..... 23. *S. macrobotrys* Ldb.
- 24. Stem wingless or occasionally with prominent angles, rather weakly winged. Plant glabrous or pubescent ..... 25.
- + Stem and petioles winged. Plants glabrous ..... 27.
- 25. Plants annual or biennial ..... 26.
- + Plant perennial, glandular-puberulent; leaves ovate or deltoid-elliptical, 1.5–2 times as long as broad; petioles 2–3 cm long; flowers 1–3 in cyme; pedicels 0.3–0.5(1) cm long; staminode orbicular, dentate, slightly broader than long .. 22. *S. amgunensis* F. Schmidt.
- 26. Plant (20)40–100 cm tall, glandular-pubescent, rarely glabrous; leaves cordate- or oblong-ovate cordate at base; petioles 0.6–1.5 cm long; corolla greenish purple; staminode reniform . 17. *S. scopolii* Hoppe.
- + Plant, up to 1–1.5 m tall, glabrous; leaves ovate or ovate-lanceolate; base orbicular or obliquely truncate; petioles 2.5 cm long; corolla brownish green; staminode obreniform ..... 13. *S. sprengeriana* Somm. and Lev.
- 27. Plant sparsely white-pubescent; leaves oblong-ovate; staminode obovate-orbicular, petaloid, narrowed at base, slightly longer than or as long as broad (rarely slightly shorter) . 27. *S. grayana* Maxim.
- + Plant glabrous; leaves ovate or oblong-ovate; staminode obcordate-bilobed or reniform, 1/3 as long as broad ..... 28.
- 28. Leaf margin serrate or crenate-serrate; pedicels 0.7–1 cm long; flowers 3 in cyme; inflorescence 16–26 cm long, 5–9 cm broad; calyx lobes orbicular with broadly scarious margin; upper corolla lip and lateral
- 236



- lobes of lower lip mostly brownish red, middle lobe and tube green; staminode obcordate-bilobed; capsule globose ... 26. *S. alata* Gilib.
- + Leaf margin crenate; pedicels 2–4 mm long; flowers 3–10 in cyme; inflorescence branched, lax 14–21 cm long, 4–12 cm broad; calyx lobes elliptical with narrow white-scarious margin; corolla greenish-yellow; staminode reniform; capsule oblong-ovoid ..... 28. *S. Czernjakowskiana* B. Fedtsch.
29. Corolla lobes equal ..... 30.
- + Corolla with lobes of upper lip longer than lateral lobes of lower lip ..... 31.
30. Leaves generally whorled, oblong-lanceolate or lanceolate, incised at base or pinnatisect; calyx glabrous; corolla yellowish green, violet inside at base; capsule ovoid-pyramidal ..... 29. *S. orientalis* L.
- + Leaves opposite, ovate-lanceolate, entire or denticulate; calyx glandular-pubescent, with unequal lobes; corolla bluish violet; capsule ellipsoid ..... 30. *S. nervosa* Benth.
31. Staminode  $1\frac{1}{3}$  or 2–3 times as broad as long or as long as broad, rarely longer than broad ..... 32.
- + Staminode 2–3(6) times as long as broad ..... 58.
32. Leaves ovate, ovate-cordate, or oblong-lanceolate, dentate or crenate, sometimes incised, rarely entire ..... 33.
- + Leaves pinnatipartite, pinnatisect or lyrate ..... 43.
33. Plant 2–10(13) cm tall, glabrous; inflorescence dense, capitate, ovate, 2–3 cm long, 1.8–2.5 cm broad; calyx  $\frac{2}{5}$ – $\frac{1}{2}$  as long as corolla with ovate or oblong, obtuse lobes ..... 31. *S. minima* M.B.
- + Plant (10)40–60 cm tall; inflorescence pyramidal, paniculate or oblong, lax, 35–40 cm long, 2.5–6 cm broad; calyx  $\frac{1}{2}$ , very rarely  $\frac{2}{3}$  as long as corolla; calyx lobes elliptical or broadly orbicular, rarely oblong ..... 34.
34. Plant biennial, glandular-pubescent; leaves ovate or oblong-ovate, coarsely crenate, 2–3.5 cm long, 1.4–2 cm broad; calyx  $\frac{1}{2}$ – $\frac{2}{3}$  as long as corolla; corolla sparsely pubescent staminode squarish, whitish or yellowish ..... 38. *S. atropatana* Grossh.
- 237 + Plants perennial, glabrous or pubescent; leaves lanceolate, ovate-lanceolate, or oblong, somewhat dentate, serrate or incise-dentate; calyx  $\frac{1}{2}$  as long as corolla; corolla glabrous; staminode different, brownish ..... 35.
35. Plants glandular-pubescent ..... 36.
- + Plants glabrous ..... 41.
36. Leaves broadly lanceolate; calyx glabrous, with oblong lobes; lobes of upper corolla lip oblong, not narrowed at base; staminode orbicular, as long as broad ..... 40. *S. litwinowii* B. Fedtsch.



- + Leaves oblong or oblong-ovate; calyx glabrous or glandular-pubescent, with orbicular lobes; staminode ovate, oblong or cordate-rhombic, as long as broad or slightly longer ..... 37.
- 37. Leaves coarsely serrate; flowers 1–3 in cyme; calyx sparsely glandular-pubescent,  $2/5$ – $2/3$  as long as brownish-red corolla with red upper lip; stamens included in corolla; staminode ovate ..... 32. *S. sareptana* Kleopov.
- + Leaves irregularly or coarsely dentate, almost incised or incise-serrate; flowers 1–5 in cyme; calyx glabrous,  $1/2$ – $2/3$  as long as yellowish or dark red corolla; stamens exserted; staminode ovate, obovate, oblong or cordate-rhombic ..... 38.
- 38. Corolla dark red, 0.5–1 cm long; staminode cordate-rhombic,  $1\frac{1}{3}$  as long as broad; leaf margin with a few (3–5), large, upward-directed obtuse teeth ..... 35. *S. goldeana* Juz.
- + Corolla greenish yellow red, 0.4–0.6 cm long; staminode ovate, obovate, orbicular or oblong ..... 39.
- 39. Leaves oblong or oblong-ovate, irregularly dentate or incise-serrate, 1.5–3.5 cm long, 0.6–1.5 cm broad, corolla 5–6 mm long, yellowish, with dark red upper lip; staminode ovate or almost oblong; capsule twice as long as calyx ..... 34. *S. rupestris* M.B.
- + Leaves ovate, coarsely subdentate or irregularly coarsely crenate, 2.2–3 cm long, 1.1–2.5 cm broad; corolla yellowish green or greenish red, 4.5–5 mm long; staminode obovate or orbicular; capsule 2–3 times as long as calyx ..... 40.
- 238 40. Plant 10–25 cm tall; leaves ovate or oblong-ovate, 2.2–2.4 cm long, 0.9–1.4 cm broad; calyx 6 mm long; pedicels slender, 0.4–1 cm long; capsule broadly ovoid, 4.6 mm long, as broad, with 1–1.5 mm long beak ..... 36. *S. charadzei* Kem.-Nath.
- + Plant 20–60(80) cm tall; leaves broadly ovate, 2–3 cm long, 1.1–2.5 cm broad, petioles narrowly winged, 2–3 mm long; pedicels somewhat thick, 3 mm long; capsule shortly ovoid, 4 mm long, 4.5 mm broad, with 0.5 mm long beak 37. *S. imerethica* Kem.-Nath.
- 41. Leaves lanceolate-oblong, (0.3)0.4–1.2 cm broad, somewhat acutely dentate, rarely flowers sessile or on 1.3–1.5 mm long pedicels; cymes 1–3-flowered, forming lax 30–40 cm long, 3–6 cm broad inflorescence; corolla dark purple, lobes of upper lip 3 times as long as lateral lobes of lower lip; stamens exserted; staminode reniform, as long as broad ..... 39. *S. nachitschevanica* Grossh.
- + Leaves broadly lanceolate or obovate, 0.5–2 cm broad, incise-dentate or incised into short lobes at base; pedicels 3.7 mm long; flowers in narrow 9–27 cm long and 2–3.5 cm broad inflorescence; corolla reddish or yellowish brown or yellowish violet, lobes of upper lip

- 2-2.5 times as long as lateral lobes of lower lip; staminode obdeltoid or obovate, as long as, or slightly longer than broad ..... 42.
42. Leaves broadly lanceolate, 0.5-1.5 cm broad, incise-dentate; pedicels 3-5 mm long; cymes 3-7 flowered; pedicels 3-5 mm long; cymes 3-7 flowered, forming 20-27 cm long, 3 cm broad inflorescence; corolla reddish or reddish brown; stamens included; staminode triangular-orbicular, as long as broad ..... 41. *S. frigida* Boiss.
- + Leaves obovate or ovate-lanceolate, 1.5-2 cm broad, incise-dentate or incised into short lobes at base; pedicels 3-7 mm long, cymes 1-3-flowered, forming 9-12.5 cm long, 2-3.5 cm broad inflorescence; corolla yellowish violet or yellowish brown; stamens exserted; staminode obovate, obtuse or emarginate, slightly longer than broad ..... 42. *S. integrifolia* Pavl.
43. Plant glandular-puberulent; stems dark purple, brown or reddish at base ..... 44.
- + Plants glabrous; stems generally green, rarely dark purple or reddish black at base ..... 45.
44. Plants herbaceous; stems numerous, spreading, projecting; leaves ovate-lanceolate, pinnatisect, with linear-oblong, acute, irregularly acute-dentate segments; calyx 1/2 as long as corolla, glabrous, with elliptical lobes; corolla brownish-red; staminode semi orbicular, as long as broad ..... 50. *S. grossheimii* B. Schischk.
- + Semishrub; stems erect or ascending; leaves oblong, pinnatisect, with lanceolate or linear-lanceolate, incise-dentate segments; calyx 1/3-1/2 as long as corolla, glandular-pubescent, with orbicular lobes; corolla yellowish; staminode triangular-spatulate, slightly longer than broad ..... 33. *S. donetzica* Kotov.
45. Corolla dull brown or brownish green; lobes of upper lip almost equaling lateral lobes of lower lip; staminode reniform, half as long as broad; capsule globose-ovoid, 2-3 times as long as calyx, glabrous, reticulate, with a long beak, 2/3 as long as capsule ..... 46. *S. rostrata* Boiss. and Buhse.
- + Corolla differently colored; lobes of upper lip 2-3(5) times as long as lateral lobes of lower lip; capsule 1.5-2 times as long as calyx, rarely as long, smooth, with a short beak ..... 46.
46. Plants annual or biennial; corolla dark purple or dark blood red; lobes of upper lip 2-5 times as long as lateral lobes of lower lip ..... 47.
- + Plants perennial; corolla yellowish, brownish red or purple; lobes of upper lip 2-3 times as long as lateral lobes of lower lip ..... 49.
47. Plant annual or biennial; leaves oblong-ovate, doubly pinnatisect with elliptical segments; calyx glabrous or sometimes glandular-pubescent at base; lobes ovate; corolla dark purple; upper lip brighter in color, its lobes 2-2.5 times as long as lateral lobes of lower lip;

- staminode orbicular-reniform, as long as, or slightly shorter than broad; style 5 times as long as ovary ..... 44. *S. olgae* Grossh.
- + Plants biennial; leaves 2- or 3-pinnatisect; with oblong or narrowly ovate segments; calyx glabrous; with orbicular lobes; corolla dark blood-red or dark brownish red, lobes of upper lip 2-5 times as long as lateral lobes of lower lip; staminode ovate, orbicular or reniform. Style 2.5 times as long as ovary ..... 48.
- 240 48. Plants 40-60 cm tall; stems glabrous; leaf segments oblong; pedicels 0.5-1 mm long; cymes 5-10-flowered, with 1-1.5 cm long peduncles, forming narrow 15-35 cm long, 2-4.5 cm broad inflorescence; corolla dark brownish red; lobes of upper lip 3-5 times as long as lateral lobes of lower lip; staminode reniform, more or less emarginate, 2/3 as long as broad; capsule 1.5 times as long as calyx or almost equaling it ..... 43. *S. rutifolia* Boiss.
- + Plants 18-40 cm tall; stems glandular-pubescent above; leaf segments narrowly ovate; pedicels 1-4.5 mm long. Cymes 3-7(8) flowered with 0.5-1.7 cm long peduncles; inflorescence 5-20(27) cm long, 3-4.5 cm broad; corolla dark blood-red; lobes of upper lip brighter in color, twice as long as lateral lobes of lower lip; staminode ovate or orbicular, entire or obscurely dentate, as long as broad; capsule 1.5 times as long as calyx ..... 45. *S. armeniaca* Bordz.
49. Corolla yellowish or pale yellow, sometimes dark red; upper lip purple; calyx 1/2-2/3 as long as corolla; leaves lyrate-pinnatisect .. 50.
- + Corolla purple, dark purple or brown; calyx 1/3-2/5 (1/2) as long as corolla; leaves pinnate, rarely lyrate-pinnatisect ..... 52.
50. Inflorescence dense, oblong, spicate, up to 5.5 cm long; capsule ovoid, slightly exceeding calyx ..... 47. *S. ruprechtii* Boiss.
- + Inflorescence lax, paniculate, pyramidal, up to 10 cm long; capsule globose, 1.5-2 times as long as calyx ..... 51.
51. Plants up to 60 cm tall; inflorescence up to 10 cm long; corolla 4.5-5 mm long, yellowish; upper lip purple; stamens included; staminode reniform, broadly cordate at base ..... 48. *S. olympica* Boiss.
- + Plants 15 cm long; inflorescence up to 5 cm long; corolla 6 mm long, uniformly dark red; stamens exserted; staminode orbicular, narrowed at base, sometimes obscurely coarsely dentate ... 49. *S. exilis* Popl.
52. Pedicels 0.5-1.7 cm long; cymes 1-3-flowered, bracts narrowly linear, almost filiform; calyx 1/3-2/3 as long as corolla, with elliptical or ovate, sometimes orbicular lobes; staminode orbicular, sometimes obtusely 5-angled or ovate-spatulate, entire or obscurely dentate .... 53.
- 241 + Pedicels 0.1-0.7 cm long; cymes 1-2-flowered; bracts lanceolate or linear; calyx 2/5-1/2 as long as corolla with orbicular lobes; staminode



- deltoid, reniform or orbicular, sometimes crenate-dentate in upper part ..... 56.
53. Inflorescence branched, up to 35 cm long; calyx lobes ovate,  $1/3-1/2$  as long as corolla; corolla dark purple or brownish red; lobes of upper lip 2-3 times as long as lateral lobes of lower lip; staminode orbicular, narrowed at base, slightly broader than long, with obscurely dentate margin ..... 54.
- + Inflorescence unbranched, 8-25 cm long; calyx lobes elliptical or orbicular,  $1/2-2/3$  as long as corolla; corolla brown or yellowish brown; lobes of upper lip 1.5-2 times as long as lateral lobes of lower lip; staminode obovate-spatulate, orbicular or obtusely 5-angled, slightly longer than or as long as broad, entire ..... 55.
54. Flowers sessile or on glandular-pubescent pedicels and peduncles; calyx  $1/3-2/5$  as long as corolla, sometimes sparsely glandular-hairy at base; corolla 5.5 mm long, brownish red or dark purple; lobes of upper lip dark red, thrice as long as lateral lobes of lower lip and up to twice as long as staminode ..... 51. *S. xanthoglossa* Boiss.
- + Flowers on glabrous pedicels and peduncles; calyx half as long as corolla, glabrous; corolla 3.5 mm long, reddish brown; lobes of upper lip red, twice as long as lateral lobes of lower lip and equaling a large staminode ..... 52. *S. striata* Boiss.
55. Inflorescence 8-15 cm long; calyx half as long as corolla, with broadly elliptical lobes; corolla brown; lobes of upper lip dark violet, almost black, twice as long as lateral lobes of lower lip; staminode obovate-spatulate, suborbicular, slightly longer than broad ..... 58. *S. multicaulis* Turcz.
- + Inflorescence up to 25 cm long; calyx  $2/3$  as long as corolla, with orbicular lobes; corolla yellowish brown; lobes of upper lip sometimes reddish, 1.5-2 times as long as lateral lobes of lower lip; staminode orbicular, obtusely 5-angled, as long as broad ..... 56. *S. pamiro-alaica* Gorschk.
56. Corolla reddish; lobes of upper lip 3 times as long as lateral lobes of lower lip; staminode reniform, obscurely tridentate above, thrice as broad as long; style 2.5 times as long as ovary ..... 55. *S. zaravschanica* Gorschk. and Zakir.
- 242 + Corolla brown or reddish; lobes of upper lip twice as long as lateral lobes of lower lip; staminode deltoid or elliptical, as long as, or slightly longer than broad, sometimes subdentate above; style 4-5 times as long as ovary ..... 57.
57. Calyx glabrous; corolla reddish; filaments sparsely glandular-pubescent; staminode deltoid ..... 54. *S. fedtschenkoii* Gorschk.



- + Calyx sometimes glandular-pubescent in lower part; corolla brown; lobes of upper lip reddish violet; filaments glabrous; staminode elliptical or almost 4-angled ..... 57. *S. gontscharovii* Gorschk.
- 58. Leaves oblong-ovate to linear, acute, narrowed at both ends, coarsely serrate or dentate, sometimes entire or pinnatipartite, rarely incised-dentate ..... 59.
- + Leaves oblong-ovate or linear, all pinnatifid or pinnatisect, sometimes pinnatipartite, rarely lyrate-pinnatisect ..... 62.
- 59. Semishrub, glabrous, bark covered with whitish bloom, year-old branches without bloom, greenish violet; leaves oblong, sessile, entire; corolla brownish red; upper lip bright red, lobes slightly exceeding lateral lobes of lower lip; staminode lanceolate, acuminate, 2.5 times as long as broad; seeds 2 mm long, 1.2 mm broad ..... 60. *S. leucoclada* Bge.
- + Plants perennial or biennial; stems without whitish bloom; leaves oblong to linear, dentate, rarely serrate; corolla with lobes of upper lip 1.5–3 times as long as lateral lobes of lower lip; seeds 1–1.5(1.7) mm long, (0.5)0.7–0.8 mm broad ..... 60.
- 60. Plant biennial, glabrous; leaves oblong, acute, dentate; calyx lobes ovate; capsule 1.5 times long as calyx ..... 59. *S. haematantha* Boiss. and Heldr.
- + Plants perennial, glandular-pubescent, very rarely glabrous; leaves oblong-ovate to lanceolate, dentate, rarely pinnatipartite ..... 60.
- 61. Leaves oblong-ovate to oblong, obtuse, dentate or pinnatipartite, 1.5–5 cm long, 1–2 cm broad; calyx glandular-pubescent; corolla brownish dark purple; lobes of upper lip 1.5 times as long as lateral lobes of lower lip; capsule twice as long as calyx ..... 62. *S. canascens* Bong.
- 243 + Leaves lanceolate or linear, 1–2.5 cm long, 0.2–0.5 cm broad, acute, with a few large teeth along margin; calyx sparsely glandular-pubescent; corolla dark blood-red or reddish; lobes of upper lip thrice as long as lateral lobes of lower lip; capsule 1.5 times as long as calyx ..... 61. *S. cretacea* Fisch.
- 62. Plants biennial ..... 63.
- + Plants perennial ..... 66.
- 63. Plant glabrous; leaves pinnatipartite, with oblong, incised lobes; inflorescence broadly paniculate, 25–30 cm long; corolla brownish; lobes of upper lip slightly exceeding lateral lobes of lower lip; staminode oblong, subacute, 2–2.5 times as long as broad ..... 72. *S. sangtodensis* B. Fedtsch.
- + Plants pubescent; leaves deeply, sometimes even multi-pinnatisect or lyrate-pinnatipartite, with narrowly linear or somewhat oblong lobes;

- inflorescence 7–23 cm long; corolla purple or blood red; lobes of upper lip 1.5–3 times as long as lateral lobes of lower lip ..... 64.
64. Plant 17–30 cm long, glandular-hairy throughout; leaves oblong-ovate, all deeply pinnatisect, with narrow-linear acute lobes; inflorescence 7–10 cm long, 1.2–2 cm broad, calyx lobes with narrow white margin; corolla dark purple; lobes of upper lip 1.5 times as long as lateral lobes of lower lip; staminode oblong, 1.5–2 times as long as broad ..... 63. *S. zuvandica* Grossh.
- + Plants 20–60 cm tall, covered throughout with numerous white, calcified, round, plane hairs; leaves oblong-elliptical, lyrate-pinnatipartite, sometimes multipinnatisect; lower leaves generally entire, sometimes coarsely dentate-lobed; inflorescence up to 23 cm long; calyx lobes with broad, white- or brown-scarious margin; corolla blood-red or purple; lobes of upper lip 2–3 times as long as lateral lobes of lower lip ..... 65.
65. Radical leaves numerous (10–20), forming rosette, oblong-elliptical, subdentate-lobed or lyrate-pinnatipartite; cauline leaves few, often doubly pinnatipartite; upper corolla lip brighter in color, with lobes 3 times as long as lateral lobes of lower lip; staminode oblong or oblong-ovate, 2 times as long as broad ..... 64. *S. pruinosa* Boiss.
- 244 + Leaves multi-pinnatisect, rarely radical leaves entire or lobed; corolla uniformly colored; lobes of upper lip 2 times as long as lateral lobes of lower lip; staminode oblong, 3 times as long as broad ..... 65. *S. dissecta* (B. Fedtsch.) Gorschk.
66. Plants glandular-pubescent ..... 67.
- + Plants glabrous ..... 68.
67. Plant perennial, herbaceous; leaves 3–4 cm long, 1.5–2 cm broad; inflorescence racemose, 6–20 cm long, 1.5–3 cm broad; calyx lobes with narrow white-scarious margin; corolla dark purple, sparsely glandular-pubescent outside; lobes of upper lip 3 times as long as lateral lobes of lower lip; staminode oblanceolate, with three small teeth; capsule with beak almost equaling it ..... 70. *S. czapandaghii* B. Fedtsch.
- + Semishrub; leaves 1–1.5 cm long, 0.6–0.8 cm broad; inflorescence pyramidal, oblong, 3–11(15) cm long, 2–3 cm broad; calyx lobes with broad scarious margin; corolla glabrous, yellowish; upper lip dark red with lobes 2.5 times as long as lateral lobes of lower lip; staminode obovate or ovate-spatulate, rarely oblong; capsule shortly mucronate ..... 67. *S. variegata* M.B.
68. Plants with numerous, virgate, erect, simple or sometimes branched stems ..... 69.
- + Plants with nonvirgate branched stems ..... 70.
69. Leaves pinnatisect, with narrowly lanceolate, generally linear, entire lobes; pedicels longer than calyx; cymes 3–5-flowered forming

- 10–18(30) cm long inflorescence; corolla purple; lobes of upper lip purplish violet, 2 times as long as lateral lobes of lower lip; lobes of lower lip whitish or yellowish above; staminode oblong, acute, purple, with whitish margin, sparsely glandular-pubescent ..... 68. *S. thesioides* Boiss. and Buhse.
- + Leaves pinnatisect, lobes oblong-lanceolate or obovate, incise-serrate; flowers sessile or on pedicels  $\frac{1}{4}$ – $\frac{1}{2}$  as long as calyx, cymes 2–9-flowered, forming 15–30 cm long inflorescence; corolla scarlet, purple or dark red; lobes of upper lip with whitish margin, 3–4 times as long as lateral lobes of lower lip; staminode lanceolate, acute, smooth, sometimes absent ..... 66. *S. canina* L.
70. Leaves pinnatipartite ..... 71.
- + Leaves deeply incised, lyrate-pinnatipartite, coarsely dentate, often doubly dentate, or entire ..... 72.
- 245 71. Lower leaves 2–6 cm long, 1–1.5 cm broad with oblong, acute lobes; inflorescence 20 cm long, 3–4 cm broad; corolla dark red; lobes of upper lip 2 times as long as lateral lobes of lower lip; stamens included; staminode lanceolate, acuminate, 2–3 times as long as broad; capsule globose ..... 69. *S. turcomanica* Bornm. and Sint.
- + Leaves 0.8–1.7 cm long, 0.3–1 cm broad, lobes oblong-lanceolate, dentate, subacute; inflorescence 3.5–4 cm long, 1.2–1.5 cm broad; corolla violet; lobes of upper lip slightly exceeding lateral lobes of lower lip; stamens exserted, staminode oblong, 3 times as long as broad, acuminate; capsule globose ..... 71. *S. kabadianensis* B. Fedtsch.
72. Lower leaves obovate-cuneate, subdentate, other leaves pinnatisect or doubly pinnatisect, lobes dentate, narrowly lanceolate or linear, acute; calyx half as long as corolla, with oblong lobes; corolla purplish brown, lobes of upper lip 3–4 times as long as lateral lobes of lower lip, lateral lobes white margined in upper part; staminode orbicular, narrowed at base, yellowish, equaling or sometimes exceeding lobes of upper corolla lip ..... 53. *S. decipiens* Boiss. and Kotschy.
- + Lower leaves sometimes and other leaves generally deeply incised, lyrate-pinnate or dentate, with linear-lanceolate lobes; calyx  $\frac{1}{4}$ – $\frac{1}{2}$  as long as corolla, with orbicular lobes; corolla dark purple, lobes of upper lip 2 times as long as lateral lobes of lower lip; staminode oblong or lanceolate, 2–2.5 times as long as broad ..... 73.
73. Plants up to 85 cm tall; leaves pinnatisect or sometimes deeply incised or lyrate-pinnate at base, with linear-lanceolate, serrate-dentate lobes; calyx  $\frac{1}{3}$ – $\frac{1}{2}$  as long as corolla; staminode lanceolate ..... 73. *S. kiriloviana* Schischk.

- + Plants up to 45 cm tall; leaves oblong-elliptical or ovate-lanceolate, doubly dentate, entire or lyrate-pinnatifid; calyx  $1/4-1/3$  as long as corolla; staminode oblong ..... 74. *S. incisa* Weinm.

Section 1. *Anastomosanthos* Stiefelhag. in Bot. Jahrbüch. 44 B (1910) 428.—Plants densely leafy. Lower leaves (2.6)3.5–15(17) cm long, (3)6–11(13) cm broad, entire, with distinctly anastomosed veins underneath.

- 246 Subsection 1. *Vernales* Stiefelhag. in Bot. Jahrbüch. 44 B (1910) 428.—Corolla lobes equal. Staminode absent.

Series 1. *Lateriflorae* Gorschk.—Leaves lanceolate, oblong or elliptical-cordate, 2–5 times as long as broad. Plants perennial.

1. *S. verticillata* Gontsch. and Grig. in Tr. Tadzh. bazy Akad. Nauk SSSR, II (1936) 180.

Perennial. Plants up to 120 cm tall. Stems numerous, glabrous, cylindrical, sulcate, leafy, internodes much shorter than leaves. Leaves in whorls of 6, lanceolate, 15–17 cm long, 2.2–2.7 cm broad, abruptly narrowed at base, gradually tapering toward apex, acute, entire, glabrous, thin, prominently pinnate-veined beneath. Flowers numerous on 4–5(6) mm long pedicels, 3–5 in a cymes; cymes 6–8 together in verticil, with 1.3–2 cm long peduncles forming leafless, oblong, interrupted, 40 cm long and up to 5 cm broad inflorescence. Bracts 6 in verticil, linear, 7–8 mm long, glandular-puberulent. Calyx  $2/5$  as long as corolla; lobes elliptical or orbicular-elliptical, 2 mm long; green, with narrow scarious margin. Corolla green, 6 mm long, campanulate-urceolate; lobes subequal, orbicular-truncate, about 1.5 mm long, 1.2–1.3 mm broad. Stamens exserted; filaments glandular-pubescent; anthers large, suborbicular; staminode absent. Style 6 mm long, subarcuate. Capsule globose-ellipsoid, 6 mm long. July.

In mountains near lower edge of subalpine belt at 2680 m.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from Vakhsh Range toward north of Baldzhuan. Type lost.

2. *S. lateriflora* Trautv. in Bull. Acad. Pétersb. X (1866) 396; Boiss. Fl. or. IV, 392; 455; Grossh. Fl. Kavk. III, 374.—*S. clandestina* Rupr. ex Boiss. Fl. or. IV (1879) 392.—*Ik.*: Bot. Jahrb. XXII, tab. 16, f. 45–48.—*Exs.*: Herb. Fl. Cauc. No. 587.

Perennial. Plant 25–60 cm tall, bluish gray or bluish green. Stems slender, somewhat fusiform, generally violet, simple or sometimes branched, glabrous or pubescent (f. *pubescens* Boiss.). Leaves opposite, oblong-lanceolate, rarely subfalcate, (2.5)8–12(21) cm long, (0.6)2.5–4(7) cm broad, mucronate, bluish-green, cordate at base, serrulate,



glabrous or lower leaves sparsely pubescent beneath along veins (f. *pubescens* Boiss.), all with 3 mm long petioles. Flowers numerous, 247 on filiform glabrous 1–2 cm long pedicels, 2.5–5 times as long as corolla, cymes lateral 3–5(8)-flowered, sparse, with glabrous axillary 1–2.5 cm long peduncles, shorter than leaves. Bracts linear-subulate or setaceous, 0.7–1.5 mm long. Calyx glabrous, 1.5–2 mm long, cleft halfway: lobes deltoid-ovate, 1–1.3 mm long, 1–1.2 mm broad, subacute, with narrow white-scarious margin. Corolla light green, 3.8–4 mm long, lobes equal, 1 mm long. Stamens exserted; filaments glabrous; staminode absent. Ovary ovoid, smooth, 1.5 mm long and broad: style glabrous, 2.5 mm long. Capsule globose-ovoid, smooth, yellowish brown, 3.5–4(5) mm long and broad, acute. Seeds ellipsoid, dark brown, 0.7 mm long, 0.4 mm broad. May to July.

In alpine and subalpine mountain belts, beech forests, forest edges, glades, along river and stream banks.—*Caucasus*: Ciscaucasia (between Kora and Daem). Dagestan, western and eastern Transcaucasia. Endemic. Described from Muri. Type in Leningrad.

3. *S. nikitinii* Gorsch. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XVI (1954) 333.

Perennial. Plant 45–50 cm tall. Stems, petioles, pedicels and calyces densely covered with crystalline salt grains. Stem cylindrical, erect. Leaves oblong or oblong-elliptical, smooth, obtuse; lower leaves 2.6–3.2 cm long, 1.5 cm broad; middle 4.5–9 cm long, 2.4–3 cm broad, both with 2 cm long petioles; upper leaves oblong or oblong-lanceolate, 3.5–5 cm long, 0.6–1.4 cm broad, subacute, sessile or with 3–5 mm long petioles; all leaves entire or upper coarsely dentate, with sparse, anastomosed veins beneath. Inflorescence narrow, 7–18 cm long, 0.6–0.8 cm broad. Bracts lanceolate-linear or linear, 1.5–2 mm long, 0.2–0.3 mm broad, acute. Flowers numerous, on 1 mm long pedicels. Calyx  $\frac{1}{2}$  as long as corolla; lobes elliptical 1.8 mm long, 1.5 mm broad, with broad white-scarious margin. Corolla greenish brown, 5 mm long, sparsely glandular-puberulent outside; lobes of upper lip elliptical, slightly exceeding lateral lobes of lower lip. Stamens exserted; filaments diffusely glandular-pubescent; staminode absent. Ovary globose, 1 mm in diameter; style 5 times as long as ovary. Capsule globose, (4)5–6 mm in diameter, smooth, brown, mucronate. Seeds oblong, 0.7 mm long, 0.4 mm broad. May to June.

On northern slopes of mountains.—*Soviet Central Asia*: mountainous regions of Turkmenia (Badkhyz). Endemic. Described from Gyaz-Gyadyk Range, near Rakhmatur Pass. Type in Leningrad. Isotype in Ashkhabad.

4. *S. tadshicorum* Gontsch. in Tr. Tadzh. bazy Akad. Nauk SSSR, II (1936) 182.

Perennial. Plant 90–110 cm tall, densely glandular-pubescent except for corolla, ovary and capsule. Stems solitary or few, erect, almost 4-angled, sparsely glandular-pubescent below, densely above. Leaves elliptical-cordate; lower 11–17 cm long, 6.6–10(13) cm broad; upper 5–6.6 cm long, 3.5–4 cm broad, acute or subacute, irregularly sharply dentate, deeply cordate at base; upper surface bright green, with scattered minute appressed glandular hairs and isolated simple, white, long hairs; lower surface grayish, densely glandular-puberulent; all leaves with glandular-pubescent 4.5–6 cm long (2.5–3 cm long in upper leaves) petioles; floral leaves oblong-lanceolate, 2.5–3 cm long, 0.4–1.3 cm broad, acute, with 0.7–1.5 cm long petioles; middle and upper floral leaves linear, 1.2–2 cm long, 1–2 mm broad, subacute, sessile. Flowers numerous, on 3–9 mm long pedicels, solitary or in 2–3-flowered cymes with 1–3.5(6) cm long common peduncles, forming sparse pyramidal, oblong 19–32(50) cm long, 10 cm broad inflorescence. Bracts linear-lanceolate or linear, 2–6 mm long, equaling or shorter than pedicel. Calyx divided almost to base, 5 mm long, densely glandular-pubescent, lobes lanceolate-linear, 4 mm long, 1–1.2(1.5) mm broad, subobtusate, with narrow scarious margin. Corolla campanulate, green, 5–6 mm long, 3–4 mm broad, glabrous, lobes of upper lip oblong-orbicular, generally equaling lateral lobes of lower lip. Stamens exserted; filaments glandular; staminode absent. Ovary globose-ovoid, 1.5 mm long, 1.3–1.5 mm broad; style 4 times or more in length than ovary. Capsule globose-conical, 5–6 mm long, 4–5 mm broad, glabrous. Seeds oblong, obtuse, 1 mm long, 0.5–0.6 mm broad. July. (Plate X, fig. 1).

In maple-rose region of scrub-forest zone.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from Vakhsh Range, from western slope of Mt. Sufan Mir-Tau. Type in Leningrad.

Series 2. *Chrysanthae* Gorschk.—Leaves ovate or cordate, usually as long as broad. Plants generally annual or biennial.

5. *S. kotschyana* Benth. in DC. Prodr. X (1846) 303; Boiss. Fl. or. IV, 390; Grossh. Fl. Kavk. III, 374.—*S. byzantina* Benth. in DC. Prodr. X (1846) 303.—*S. viscosa* Boiss. Fl. or. IV (1879) 391.—*lc.*: Oesterr. Bot. Zeitschr. I, tab 3, f. 20.

Biennial. Plants 20–60 cm tall, more or less glandular-tomentose (except calyx and corolla). Stem brownish or usually light violet, flexuous. Leaves thin, delicate, orbicular-cordate, 7–9 cm long, 7–11(13) cm broad, base cuneate, margin incise-dentate, ciliate; petioles 2–6 cm long, lower petioles 16 cm long; upper leaves 3.5–8 cm long, 4–10 cm broad, subsessile. Flowers sparse; pedicels, 1 cm long, almost 3 times as long

as calyx, sparsely glandular-pubescent, subglabrous in upper part, flowers 2–5 in terminal, opposite, axillary cymes with 1–2 cm long glandular-hairy peduncles, in lax pyramidal, 15–25(30) cm long, 3–6 cm broad paniculate inflorescence. Bracts linear, 1.5–2 mm long, 0.5 mm broad, acute, 1/5 as long as pedicels. Calyx glabrous, deeply parted, 3–3.5 mm long, lobes broad, ovate, obtuse, fringed, 2–2.5 mm long, 1–1.5 mm broad. Corolla dull pink, urceolate, glabrous, 7 mm long, 5 mm broad, lobes subequal. Stamens exserted; filaments glabrous; staminode absent. Ovary ovoid, 2 mm long, dark brown, glandular-pubescent; style filiform, 3–4 times as long as ovary, erect or slightly bent above. Capsule ovoid, yellowish, 5–7 mm long, 4.5–6 mm broad, apiculate, glandular-puberulent. Seeds ellipsoid, 1 mm long, 0.6 mm broad, dark brown. April.

In middle mountain zone.—*Caucasus*: western Transcaucasia. *General distribution*: Asia Minor (eastern Anatolia). Described from Taurus Mts. Type in Leningrad.

6. *S. chrysantha* Jaub. and Spach; Illustr. pl. or. III (1847–1850) 26; Boiss. Fl. or. IV, 390; Grossh. Fl. Kavk. III, 374.—*S. vernalis* M.B. Fl. taur.-cauc. II (1808) 76, non L.—*S. minima* Benth. in DC. Prodr. X (1846) 303, non M.B.—*S. congesta* Stev. in Bull. Soc. Nat. Mosc. XXX, I (1857) 348.—*S. chrysantha* var. *intermedia* Somm. and Lev. in Tr. Bot. sada, XVI (1900) 360.—*S. calycina* Boiss. in Bal. exs. 1866.—*lc.*: Jaub. and Spach, l.c. tab. 220; Bot. Mag. CVIII tab. 6629.—*Exs.*: Fl. Cauc. exs. No. 73; Pl. or. exs. No. 196.

Biennial. Plant 13–60 cm tall, crispate-hirsute, covered with white, up to 3.5 mm long hairs. Stem simple, erect, almost 4-angled, violet. Leaves thin, rugose, upper surface sparsely pubescent, lower more densely so; radical leaves cordate- or subreniform-orbicular, (2)3.5–5 cm long, (1.8)3–5.5 cm broad, obtuse, doubly dentate with 6–8 cm long villous petioles; cauline leaves opposite, similar to radical leaves, 3–3.5 cm long and 3–3.5 cm broad, with 1–3 cm long petioles; upper leaves ovate-cordate, as long as cauline, with 0.5–0.7 cm long petioles or subsessile; floral leaves ovate, connivent, 2 cm long, 0.8 cm broad, sessile. Flowers numerous, on 4 mm long pedicels, in cymes with 0.6–1.5 cm long peduncles, forming dense, ovoid, oblong or sometimes almost semiglobose leafy 0.5–2.5 cm long, 1.5–3 cm broad inflorescence or pyramidal lax inflorescence (var. *calycina* Boiss.). Bracts lanceolate or lanceolate-linear, pubescent, 2–4 mm long, 0.3 mm broad, shorter than or equaling pedicels. Calyx green, 4–4.5(7) mm long, densely white glandular-hairy; lobes lanceolate-oblong, 4(5) mm long, 1 mm broad. Corolla 6.5(10) mm long, urceolate, subglobose (var. *calycina* Boiss.), glabrous, yellow, with 250 5 short lobes, four of them suborbicular, convergent, slightly exceeding the lower obovate orbicular recurved lobe. Staminode absent; stamens



exserted; filaments glandular-pubescent. Ovary sparsely glandular-hairy, ovoid, 1 mm long and broad; style filiform, 5–10 times as long as ovary somewhat curved above; stigma subglobose, obscurely 2-lobed. Capsule oblong, 5.5(9) mm long, 4.5 mm broad, mucronate, glandular-puberulent. Seeds oblong, 0.7 mm long, 0.4 mm broad, dark brown, almost black. May to July.

In upper mountain zone (up to 2500 m.) in rocky areas and subalpine grasslands, edges of beech and fir forests.—*Caucasus*: Ciscaucasia, western, eastern and southern Transcaucasia. *General distribution*: Armenia-Kurdistan. Described from Armenia. Type in Paris.

7. *S. lunariifolia* Boiss. and Bal. in Boiss. Fl. or. IV (1879) 390; Grossh. Opred. rast. Kavk. 307.—*S. vernalis* L. var. *lunariifolia* (Boiss. and Bal.) O. Ktze. in Tr. Bot. sada, X (1887) 222.—*S. chrysantha* var. *lunariifolia* Albov, Prodr. Fl. Colch. (1895) 188.—*S. calycina* Grossh. Fl. Kavk. III (1932) 375, non Boiss.—*Exs.*: Herb. Fl. Cauc. No. 588.

Biennial. Plant 50 cm tall. Stem glandular-pubescent above, yellowish brown or dark violet. Leaves thin, glabrous; lower leaves ovate or deeply cordate-orbicular, 4–6(14) cm long, 3.5–6(16) cm broad, doubly dentate, with 1–6.5 cm long petioles; cauline leaves broadly deltoid-ovate, 1–5 cm long, 1–5.5 cm broad, doubly serrate, with 1–1.5 cm long petioles; floral leaves similar to cauline, 1–1.2(2.5) cm long, 0.6–2.3 cm broad, sessile. Flowers on glabrous 2–5 mm long pedicels in cymes with glabrous 4–5(10) cm long peduncles and forming pyramidal, leafy 3–7 cm long, 2–3.5 cm broad inflorescence. Bracts oblong, acute, 4 mm long. Calyx 3–3.5 mm long, deeply incised, sparsely pubescent; lobes broadly lanceolate 2–2.3 mm long, 1–1.5 mm broad, acute, nonfimbriate. Corolla urceolate, 5–6 mm long, yellow, glabrous, with subequal lobes. Stamens slightly exserted, glabrous; staminode absent. Ovary ovoid, glandular-pubescent, yellowish brown, 2 mm long, 1.7 mm broad; style 5 mm long. Capsule oblong-ovoid, 6–7 mm long, 4–6 mm broad, glandular-puberulent, mucronate. Seeds 1 mm long, 0.6 mm broad, dark brown. April to June.

In lower mountain zone on grasslands, along forest edges, on rocky slopes and waste lands. *Caucasus*: western and eastern Transcaucasia. *General distribution*: Balkan States-Asia Minor. Described from Lazistan. Type in Leningrad.

8. *S. hyrcana* Grossh. Opred. rast. Kavkaza (1949) 307.—*S. vernalis* L. var. *hyrcana* Grossh. in Tr. Tifl. bot. sada, 2, 1 (1920) 21; Fl. Kavk. III, 375.

251 Perennial. Plant (20)40–100 cm tall; all parts, except corolla, densely covered with patent simple, up to 1 mm long, multicellular, white and glandular hairs. Stems erect, dark red or greenish brown, 4-angled,



glandular-hairy, especially in upper part. Lower leaves deltoid-ovate, 5 cm long, 5.5 cm broad, acute, base cordate, margin repeatedly dentate with 3–5.5 cm long petioles; cauline and floral leaves deltoid-ovate, 2–6.5 cm long, 1–6.5 cm broad, acute, base mostly cuneately truncate or oblique, margin doubly serrate, petioles 0.2–2.5 cm long; floral leaves sometimes sessile; all leaves thin, dark green, upper surface subglabrous, lower, especially veins as well as petioles, softly glandular-white-pubescent. Flowers generally numerous, on 1.8–2 mm long pedicels, glandular-puberulent, 2–5 in cymes with axillary 1–7 cm long glandular peduncles forming long lax, rarely leafy, pyramidal 6–21 cm long, 2.5–6 cm broad inflorescence. Bracts linear, acute, 1.5–2 mm long. Calyx 3.5 mm long, glandular-pubescent; lobes oblong-ovate 2.5 mm long, 1.8 mm broad, obtuse, nonfimbriate, often reflexed, glandular-ciliate. Corolla greenish yellow, urceolate, 5.5–6 mm long, 3.5 mm broad, narrowed in upper part, lobes almost identical. Stamens exserted; filaments sparsely glandular-pubescent; staminode absent. Ovary ovoid, dark brown, 1.5 mm long, 1.2 mm broad, glandular-puberulent; style 5 mm long. Capsule oblong-ovoid, 7–8 mm long, 5 mm broad, shortly mucronate, glandular-pubescent. Seeds oblong-ovoid, dark brown, 1.2 mm long, 0.7 mm broad. April to May. (Plate X, fig. 3).

In rocky areas, on forest slopes and in ravines. *Caucasus*: eastern Transcaucasia, Talysh. Endemic. Described from Talysh. Type in Leningrad.

9. *S. vernalis*. L. Sp. pl. (1753) 620; M.B. Fl. taur.-cauc. II, 76; Benth. in DC. Prodr. X, 303; Ldb. Fl. Ross. III, 215; Boiss. Fl. or. IV, 389; Schmalh. Fl. II, 265; I.c. 456.—*S. clausii* Boiss. and Buhse in Nouv. Mém. Soc. Nat. Mosc. XII (1860) 163;—*Venilia vernalis* Fourr. in Ann. Soc. Linn. Lyon. N. S. XVII (1869) 125.—*Ic.*: Fl. Dan. III, tab. 411; Engl. Bot. VI, tab. 951; Coste, Fl. fr. III, 6; Syreistsch. III. fl. Mosk. gub. III, 134; Fedtsch. and Fler. Fl. Evrop. Ross. fig. 792; Hegi, Illustr. Fl. Mittel-Eur. VI, 1, 31.—*Exs.*: Pl. Finl. exs. No. 344.

Annual or biennial. Plant (15)30–60(100) cm tall, softly glandular-hairy. Stems 4-angled, simple, sometimes branched, brown, pubescent above. Lower leaves deltoid-ovate, 4–6 cm long, 4.5–6.5 cm broad, shallow-sinuate at base, margin doubly dentate, primary teeth deltoid-ovate, large, 4 mm long, 6 mm broad (margins not overlapping), secondary 252 teeth (3–6) acute; petioles 5–8 cm long; cauline and floral leaves 2–4.5 cm long, 1.5–4.5 cm broad, deltoid-ovate, acute, base cuneate, petioles 3–6.5 cm long, margin doubly serrate, primary teeth 4–5 mm long and broad, acute, secondary teeth few (1–3.5) [sic], especially in floral leaves, the latter sessile or with 0.5–1.7 cm long petioles; all leaves thin, green, upper surface subglabrous, lower densely white-glandular-hairy along the veins and also petioles. Flowers few, on 1–1.5 mm long

slender pedicels; cymes 2–3-flowered with slender axillary 1.8–3 cm long glandular-pubescent peduncles forming lax, pyramidal, sparsely leafy, 13–15 cm long, 5–6 cm broad inflorescence. Bracts linear or oblong-linear, 2 mm long. Calyx 4–5 mm long, glandular-pubescent, lobes ovate or oblong-ovate, 3.5–4.5 mm long, 1.5 mm broad, subacute, without scarious margin, glandular-ciliate, often recurved. Corolla yellowish green, glabrous, urceolate, 6 mm long, 5 mm broad, narrow above, lobes almost identical. Stamens exserted, filaments smooth; staminode undeveloped. Ovary ovoid, glabrous, 1 mm long, 0.5 mm broad; style 6 times as long as ovary. Capsule ovoid or oblong, glabrous, 6–8 mm long, 4–5.5 mm broad, acuminate. Seeds oblong-ellipsoid, 0.7 mm long, 0.5 mm broad, dark brown. April to May. (Plate X, fig. 2).

On grassy slopes, in shady places among shrubs, in gardens and parks.—*European USSR*: Upper Volga (Moscow Province), Middle Dnieper, Volga-Don, Lower Don, Bessarabia. *General distribution*: Central and Atlantic Europe, Mediterranean Region, described from Western Europe. Type in London.

Subsection 2. *Scorodonia* G. Don, Gen. Hist. IV (1837) 507.—Lobes of upper corolla lip 2–4 times as long as lateral lobes of lower lip. Staminode variable.

Series 3. *Mimulopsis* (Boiss.) Gorschk.—*Mimulopsis* Boiss. Fl. or. IV (1879) 394, subsection.—Leaves oblong-ovate, sessile, cordate-amplexicaul at base.

10. *S. amplexicaulis* Benth. in DC. Prodr. X (1846) 310; Boiss. Fl. or. IV, 394; Grossh. Opred. rast. Kavk. 308.

- 255 Perennial. Plant 20–50 cm tall, densely glandular, sometimes with a few stellate white hairs. Stems numerous, cylindrical, simple or slightly branched at base. Lower leaves obovate, obtuse, 1.2 cm long, 0.8 cm broad, others oblong-ovate, acute or acuminate (2)4.8–5.3 cm long, 0.7–2 cm broad, cordate-amplexicaul at base. Leaves all sessile, closely veined, sharply-dentate, both surfaces glandular-hairy, with a few stellate hairs; floral leaves linear, subacute, 4–6 mm long, 0.3–0.5 mm broad, upper surface diffusely glandular-pubescent. Flowers subsessile or on erect, 2.5 mm long pedicels; pedicels and peduncles densely glandular-pubescent, with a few stellate hairs. Flowers 1–5 in regularly spaced cymes with 3–8 mm long peduncles, forming spicate, leafless, lax 3–8.5 cm long, 2–2.5 cm broad inflorescence. Bracts lanceolate-setose, 1.8 mm long, scarious, acute. Calyx glabrous or sometimes diffusely glandular-pubescent in lower part, 3 mm long; lobes ovate, with broad scarious margins, 2 mm long, 1.8–2 mm broad. Corolla glabrous, yellowish green, urceolate-campanulate, 9 mm long, 5 mm broad; lobes of upper lip oblong, somewhat narrow at base, 2–2.5 times as long as lateral lobes of lower lip.





Stamens included, filaments glabrous; staminode oblong, scaphoid, 2 times as long as broad. Ovary oblong-conical, 2.5 mm long, 2 mm broad, yellowish brown; style slightly longer than ovary. Capsule with elongated conical tip, 0.9–1.2 cm long, 4.5–6 mm broad, glabrous, acuminate. Seeds 0.7 mm long, 0.4 mm broad, dark brown. June to July.

In subalpine zone, on dry steppe slopes.—*Caucasus*: Talysh. *General distribution*: Iran. Described from Savalan in Gilyan. Type in Leningrad.

*Note*. The plant, rare in our country, was collected by N.V. Shipchinskii in 1931 from the southern part of Azerbaijan SSR, in the vicinity of the Karabakgordinsky border post, at an alt. of 2400 m.

Series 4. *Ilvenses* Gorschk.—Leaves oblong-ovate, with rounded or cuneate base, and 0.5–3 cm long petioles, usually inrosette; upper leaves sessile, auriculate, semiamplexicaul.

11. *S. ilvensis* C. Koch in Linnaea, XVII (1843) 284; Benth. in DC. Prodr. X, 310; Boiss. Fl. or. IV, 394; Grossh. Fl. Kavk. III, 375.

Annual. Plant 15–50 cm tall, diffusely glandular with black hairs. Stem erect, simple, dark or light violet. Lower leaves usually in rosette, oblong-ovate, 2–4(6) cm long, 1.7–3.5 cm broad, subacute, rounded or cuneate at base, doubly dentate-serrate, with 2–3 cm long petioles; cauline leaves 2–4.5 cm long, 0.8–3 cm broad, oblong-ovate, acute, margins doubly dentate-serrate or incised, with 0.5–1.5 cm long petioles; floral leaves 256 0.5–1.5 cm long, 0.2–0.6 cm broad, oblong-lanceolate, floral and upper leaves sessile, auriculate, semiamplexicaul. Flowers on glandular, 0.8–1.5 mm long pedicels; cymes 1–3 flowered with diffusely glandular-pubescent, 0.4–1.3 cm long peduncles, forming erect, narrow, pyramidal 2.5–17(30) cm long, 2–3 cm broad inflorescence (sometimes from the base itself). Bracts 1.5 mm long, 0.5 mm broad, oblong-lanceolate, sparsely glandular-hairy. Calyx 4 mm long, glabrous; lobes orbicular, obtuse 2 mm long, 3 mm broad, green, violet in upper part, with broad, white-scarious margin. Corolla purple, 0.9–1 cm long; lobes of upper lip orbicular, 2 times as long as the flat lateral lobes of lower lip. Stamens exserted, filaments glabrous; staminode reniform, 3 times as broad as long. Ovary yellowish brown, ovoid, 2.5 mm long and broad, glabrous; style thrice or more longer than ovary. Capsule smooth, 6–7.5 mm long, 5 mm broad, ovoid, yellowish brown, pointed. Seeds 0.7 mm long, 0.3 mm broad, yellowish brown. May to July. (Plate XI, fig. 2).

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Plate X.

1. *Scrophularia tadshicorum* Gontsch., portion of plant, section of corolla, capsule.—2. *S. vernalis* L., portions of plant, capsule, section of corolla.—3. *S. hyrcana* Grossh., portion of plant, section of corolla, capsule.



In the middle mountain zone in coniferous forests (up to 2600 m).—*Caucasus*: western, eastern and southern Transcaucasia. *General distribution*: Armenia-Kurdistan. Described from Mt. Ilvensib in Somkhetia. Type in Leningrad.

Series 5. *Divaricatae* Gorschk.—Leaves ovate-cordate or oblong-ovate, sometimes hastate, slightly longer than broad, margin sharply crenate-dentate or doubly incise-dentate; petioles (0.6)1–3 cm long.

12. *S. divaricata* Ldb. in Ind. sem. hort. Dorp. (1822) 17; Fl. alt. II, 440 in adnot.; Fl. Ross. III, 216; Benth. in DC. Prodr. X, 305; Boiss. Fl. or. IV, 397; Schmalh. Fl. II, 266; Grossh. Fl. Kavk. III, 376.—*S. georgia* Benth. l.c.—*Ic.*: Ldb. Ic. Pl. Fl. Ross. II, tab. 121.

Perennial. Plant 40–60(100) cm tall, glandular villous throughout, hairs white. Stem erect, branched obtuse-angled, more or less violet. Leaves thin, broadly cordate-ovate, 5–10(11) cm long, 5–8.5 cm broad, rugose, acute, sharply dentate-lobed or doubly incise-dentate, petioles (1.5)3–5.5 cm long; floral leaves similar in form, (1.5)2.5–5(7) cm long, (1)3–7 cm broad, acute, with 1.3 cm long petioles; all leaves and petioles lanate, ciliate. Flowers few, pedicels 1–1.2 cm long, pubescent, generally glabrous above; cymes 2–5-flowered, divaricate with villous axillary peduncles, forming lax 18(45) cm long, 4–9 cm broad panicle. Bracts narrowly linear. Calyx glabrous; lobes ovate, with narrow scarious margin, subacute, 2–2.5 mm long, 1.4–1.5 mm broad. Corolla brownish green, 6–7.5(8) mm long, 4–5 mm broad, tubular-urceolate; lobes of upper lip 257 orbicular, 3 times as long as lateral lobes of lower lip. Stamens included, filaments diffusely glandular-pubescent; staminode reniform, slightly or 2 times as broad as long. Ovary ovoid, 1–1.5 mm long, glabrous; style exserted, 4.5 mm long, filiform, curved above. Capsule ovoid, 5.5–6.5 mm long, 5–7.5 mm broad, glabrous, yellowish, mucronate. Seeds oblong or ellipsoid, 0.7 mm long, 0.4 mm broad, dark brown. June to July.

On calcareous outcrops. On mountains in the middle forest zone, in rocky places and along forest edges.—*European USSR*: Volga-Don (Voronezh Province, Bogucharsk Region on calcareous mountains along Don River). *Caucasus*: Ciscaucasia, Dagestan, western, eastern and southern Transcaucasia, Talysh. Endemic. Described from Tbilisi. Type in Leningrad.

13. *S. sprengeriana* Somm. and Lev. in Nuov. Giorn. Bot. Ital. 2, IV (1897) 202; Tr. Bot. sada, XVI, 363; Grossh. Fl. Kavk. III, 377.

Annual or biennial. Plant 1–1.5 m tall. Root fibrous. Stem stout, blackish, 4-angled, somewhat narrowly winged. Leaves glabrous; lower ovate, subobtuse with somewhat cuneate base and 2.5 cm long petioles; middle 10 cm long, 9 cm broad, acute, with rounded or oblique truncate

base; upper ovate-lanceolate or lanceolate, acute, sharply dentate. Flowers on 1.5 cm long pedicels; cymes 5-flowered with 7–8 cm long peduncles forming 50 cm long inflorescence. Bracts linear. Calyx glabrous, deeply incised, 2.5–3 mm long, lobes ovate, obtuse, with narrow scarious margin. Corolla brownish green. Stamens included, staminode obreniform. Capsule ovoid, acuminate, 6–6.5 mm long, glabrous. June to July.

In forests of the middle mountain zone.—*Caucasus*: western Transcaucasia. Endemic. Described from Svanetia in the vicinity of Cholur. Type lost?

14. *S. mollis* Somm. and Lev. in Nuov. Giorn. Bot. Ital. 2, IV (1897) 203; Tr. Bot. sada, XVI, 364; Grossh. Fl. Kavk. III, 376. *lc.*: Tr. Bot. sada, XVI, plate XXXVI.

Biennial or perennial. Plant 25–50 cm tall, green. Root almost woody. Stems drooping, obtuse-angled, covered with white, erect, patent hairs. Lower leaves subreniform, 2 cm long, 3.2 cm broad, with 3 cm long petioles; middle broadly ovate or ovate-lanceolate, 7–8 cm long, 6–7 cm broad, subcordate, with 2–3 cm long petioles; upper leaves 1.8 cm long, 0.7 cm broad, acute, petioles 0.5–0.7 cm long, all leaves repeatedly subdentate and diffusely lanate. Flowers on 0.7–1.3 cm long pubescent pedicels. Bracts linear, 0.3–0.7 cm long. Calyx glabrous, 4 mm long; lobes ovate, 3 mm long, 1.5 mm broad, without scarious margin. Corolla yellowish green, 1 cm long, lobes of upper lip 2 times as long as lateral lobes of lower lip. Stamens exserted; staminode orbicular, narrow at base, as long as broad. Ovary orbicular-ovoid; style 2.5 times as long as ovary. Capsule ovoid, 4 mm long, acuminate. May to June.

In forests.—*Caucasus*: Ciscaucasia. Endemic. Described from Larsi. Type in Florence.

*Note.* Species of doubtful status. Specimens of this species are not available in the herbarium of the Botanical Institute of Akad. Nauk SSSR. Described from diagram.

15. *S. peregrina* L. Sp. pl. (1753) 621; Benth. in DC. Prodr. X, 305; Boiss. Fl. or. IV, 395; Grossh. Fl. Kavk. III, 375.—*lc.*: Sibthor and Sm. Fl. gr. VI, tab. 597; Rchb. Ic. fl. Germ. XX, tab. 1676; Fedtsch. and Fler. Fl. Evrop. Ross. fig. p. 795.

Annual. Plant 30–60 cm tall, glandular-hairy. Stem simple or sometimes branched, glandular-pubescent. Leaves ovate-cordate, 7 cm long, 5 cm broad, coarsely dentate, truncate at base, subglabrous, lower surface sometimes glandular-hairy, especially along veins; petioles glabrous or sometimes pubescent, 1.4 cm long; floral leaves 0.7–3.5 cm long, 2.5 cm broad, somewhat lanceolate, dentate, acute. Flowers on glandular-hairy up to 1 cm long pedicels; cymes 2–5-flowered with pubescent, axillary,

1–2 cm long peduncles, forming lax, (4)12–28 cm long, 2.5–4 cm broad paniculate inflorescence. Calyx 2.5 mm long, glabrous; lobes lanceolate, acute, without scarious margin, 2 mm long, 1.2 mm broad. Corolla 5.5 mm long, 4 mm broad, short-campanulate, dark blood-red, lobes of upper lip orbicular, very narrow at base, 4 times as long as lateral lobes of lower lip. Stamens included, filaments glabrous; staminode orbicular-ovoid, as long as broad. Ovary ovoid, 1.5 mm long, 1.2 mm broad; style 2 times as long as ovary. Capsule ovoid-globose, 5.6 mm long, 4.5 mm broad, glabrous, brown, acuminate. Seeds 1 mm long, 0.7 mm broad, dark brown. May to June.

Escape in wastelands.—*European USSR*: Volga-Don (Kharkov); *Caucasus*: Ciscaucasia, western Transcaucasia (Black Sea coast). *General distribution*: Mediterranean Region, Balkan States-Asia Minor. Described from Italy. Type in London.

16. *S. chlorantha* Kotschy and Boiss. in Boiss. Fl. or. IV (1879) 399; Voron. in Vestn. Tifl. bot. sada, No. 22, 12: Grossh. Fl. Kavk. III, 376.

Perennial. Plant 50–100 cm tall, glandular-brown hairy. Stem stout, branched, obtusely 4-angled. Leaves hastate (similar to those of *Salvia glutinosa*) or ovate, deeply cordate; lower leaves 9–15 cm long, 8–10 cm broad, upper (5)6–7 cm long, 2–4 cm broad, both with acute apex, often elongated; floral leaves oblong-lanceolate, 2 cm long, 1 cm broad, long acuminate; all leaves coarsely sharply dentate, with 1–2.5 cm long petioles, upper surface sparsely, lower diffusely, glandular-hairy. Flowers numerous, on 0.8 cm long glandular-puberulent pedicels; cymes 2–4-flowered, with 4 mm long peduncles, forming dense, terminal and lateral, 3.5–6 cm long, 1.5–2.5 cm broad paniculate inflorescences. Bracts setose, 4 mm long, acute, glandular-puberulent. Calyx 2.5 mm long, glandular or villous (var. *adzharica* Woron.); lobes orbicular-ovate or ovate, with narrow scarious margin, 1.8 mm long, 1.5 mm broad. Corolla dull brown or greenish yellowish brown, 5 mm long; lobes of upper lip oblong-orbicular, base not constricted, 3 times as long as lateral lobes of lower lip. Stamens included, filaments glandular-pubescent; staminode obdeltoid or oblong-obovate, as long as broad. Ovary ovoid, 1.8 mm long, 1.2 mm broad; style  $1\frac{1}{3}$  as long as ovary. Capsule ovoid, 4.5–5 mm long, 4 mm broad, or 6 mm long and 5–5.2 mm broad (var. *adzharica* Woron.), glabrous, brown, mucronate. Seeds 1.3 mm long, 0.7 mm broad, oblong, dark brown. May to July.

In forests, in the middle mountain zone.—*Caucasus*: western Transcaucasia (Batumi). *General distribution*: Armenia-Kurdistan. Described from Anatolia, from Gochkar Mountain. Isotype in Leningrad.

17. *S. scopolii* Hoppe ex Pers. Syn. II (1807) 160; Benth. in DC. Prodr. X, 308; Ldb. Fl. Ross. III, 217; Boiss. Fl. or. IV, 395;



Grossh. Fl. Kavk. III, 376; Kryl. Fl. Zap. Sib. X, 2425.—*S. auriculata* Scop. Fl. Carn. ed. II, vol. I (1772) 446, non L.—*S. grandidentata* Tenore, Fl. Nap. Suppl. II (1819) 69.—*S. betonicaefolia* Wydl. in Mém. Soc. Phys. Génèv. IV (1828) 151.—*S. scorodonia* Host, Fl. Austr. II (1831) 214; Ldb. Fl. Ross. III (1846–1851) 217, non L.—*S. decumbens* Fisch., Mey. and Ave-Lall. in Ind. sem. hort. Petrop. X (1845) 58.—*S. fontana* Kotschy ex Boiss. l.c. 396.—*S. puberula* Boiss. and Hausskn. ex Boiss. l.c. 396.—*S. scopoli* Hoppe  $\beta$ . *grandidentata* (Ten.) Boiss. l.c. 396.—*S. scopolii* Hoppe var. *adenocalyx* Somm. and Lev. in Tr. Bot. sada, XVI (1900) 361.—*l.c.*: Rchb. Ic. fl. germ. XX, tab. 1675; Fiori e Paol. Ic. fl. Ital. tab. 347; Hegi, Illustr. Fl. Mittel-Eur. VI, I, 34.

Biennial. Plant (20)40–100 cm tall, covered with scattered glandular and simple patent hairs, rarely subglabrous (var. *glabrata* Trautv.). Stem obtusely 4-angled, erect, somewhat brownish violet, glandular-pubescent. Leaves thin, cordate- or ovate-oblong, 4–9 cm long, 2.5–7.5 cm broad, base usually cordate, margin obscurely or sharply crenate-dentate or  
260 coarsely deeply doubly dentate (var. *grandicrenata* Somm. and Lev.), somewhat diffusely glandular-pubescent, with 0.6–1.5 cm long petioles. Flowers numerous, on 0.8–1.5 cm long, glandular-pubescent pedicels; cymes (1)2–4(5) flowered with axillary 1.5–2 cm long peduncles, forming lax, oblong, pyramidal inflorescence, up to 30 cm long, 3 cm broad. Bracts linear-lanceolate, almost subulate, acute, 1.5–1.8 mm long, 0.3 mm broad. Calyx 2–4.5 mm long, glabrous or glandular-pubescent (glands dark purple), incised upto 2/3, lobes ovate-orbicular, 1.5–2.5 mm long, 1–2 mm broad, margin white-scarious. Corolla greenish-purple, 0.4–1.1 cm long; lobes of upper lip orbicular, 2 times as long as lateral lobes of lower lip. Stamens included, filaments diffusely glandular-pubescent; staminode orbicular, subreniform, half as long as broad or shorter. Ovary ovoid, 1.5 mm long and broad; style 2–2.5 times as long as ovary. Capsule ovoid-globose or globose, 6–7 mm long, 4–5 mm broad, acuminate, glabrous. Seeds ellipsoid 0.7 mm long, 0.3 mm broad, dark brown. May to September.

In forests and stony places in subalpine grasslands.—*European USSR*: Volga-Kama, Lower Don (Saratov), Upper Dniester, Bessarabia, Crimea; *Caucasus*: Ciscaucasia, western and eastern Transcaucasia, Talysh. *General distribution*: Central Europe, Balkan States-Asia Minor, Iran, India-Himalayas (western part). Described from Austria. Type in London?

Series 6. *Altaicae* Gorschk.—Leaves broadly ovate or ovate-cordate, 1.5–2 times as long as broad, margin sharply toothed; petioles (0.5)1–6 cm long.

18. *S. heucheriiflora* Schrenk, Enum. pl. nov. I (1841) 25; Benth. in DC. Prodr. X, 304; Ldb. Fl. Ross. III. 216; Fedtsch. Rast. Turkest. 692; Kryl. Fl. Zap. Sib. X, 2425.



Perennial. Plant up to 80 cm tall. Stem cylindrical covered with short glandular and longer simple unicellular hairs, light or dark brown. Leaves broadly ovate or ovate-cordate, 6–13 cm long, 2.5–9 cm broad, obtuse, unequally or irregularly dentate or serrate, base cordate; petioles 1–5 cm long; floral leaves linear, 0.5–1 cm long, 1–3 mm broad, acute, sessile; all leaves subglabrous above, diffusely hairy along veins beneath. Flowers on 2–4 mm long, glandular-pubescent pedicels; cymes 2–3-flowered with 0.5–1.3 cm long glandular-hairy peduncles, forming oblong, paniculate, pyramidal, 12–15 cm long, 2–2.5 cm broad almost leafless inflorescence. Bracts linear or filiform, 4 mm long, 0.3 mm broad, acute. Bracts and calyx glandular-puberulent. Calyx 2.5–3 mm long; lobes oblong or spatulate, 1.5–2 mm long, 1 mm broad, obtuse, with or without very narrow  
 261 scarious margin. Corolla green, 4–4.5(5) mm long; lobes of upper lip orbicular, more or less equaling lateral lobes of lower lip. Stamens exserted; filaments diffusely glandular-pubescent; staminode elliptical, 2 times as long as broad. Ovary ovoid, brown, 1 mm long and broad; style long, 6–7 times as long as ovary. Capsule broadly ovoid, 7–9 mm long, 3–6 mm broad, long pointed, smooth. Seeds 0.5–0.7(1) mm long, 0.3 mm broad, yellowish brown. May to June (Plate XI, fig. 1).

In broad leaved forest zone, at the bottom and on stony slopes of foothill ravines. *Soviet Central Asia*: Balkhash Region, Dzh.-Tarbagatai, Pamiro-Alai, Tien Shan. *General distribution*: Dzh.-Kashgar (Kuldzha). Described from Ayadyr. Type in Leningrad.

19. *S. altaica* Murr. in Comment. Soc. Sc. Götting, (1781) 35; Bge. in Ldb. Fl. alt. II, 441; Benth. in DC. Prodr. X, 305; Ldb. Fl. Ross. III, 216; Kryl. Fl. Zap. Sib. X, 2424.—*S. marylandica* Georgi, Besch. Russ. Reich. III, 4 (1800) 1108, non L.—*lc.*: Murray, l.c. tab. 2.

Perennial. Plant 15–65 cm tall, glandular-pubescent. Stem erect or sometimes flexuous, ribbed, simple or branched above, glandular-pubescent. Leaves cordate-ovate or suborbicular, 2–15 cm long, 1.3–10 cm broad, thin; petioles (1.5)4–6 cm long; floral leaves oblong-lanceolate 1.7 cm long, 0.4–1 cm broad; all leaves unequally doubly dentate, upper surface more or less glabrous or sparsely pubescent, densely glandular-pubescent beneath, especially along veins, base, as well as petioles. Flowers on glandular-pubescent 0.5–0.8 cm long pedicels; cymes 1–6-flowered with axillary 0.5–1 cm long peduncles, forming narrow, racemose 4–14(20) cm long, 2.5–3 cm broad inflorescence. Bracts linear, 3–5 mm long, acute, shorter than calyx, glandular-pubescent. Calyx 5.5 mm long, lobes lanceolate or broadly lanceolate, 4.5 mm long, 1 mm broad, subacute, without scarious margin, slightly divaricate. Corolla yellowish white, 8 mm long; lobes of upper lip orbicular, 2 times as long as lateral lobes of lower lip. Stamens included, filaments glandular;

staminode obovate or orbicular, slightly emarginate above, as long as broad. Ovary ovoid, 2 mm long and broad, diffusely glandular-puberulent; style slightly exceeding ovary. Capsule ovoid, 6–8 mm long, 5–6.5 mm broad, glandular-puberulent, glabrescent at maturity. Seeds 0.7 mm long, 0.3 mm broad, ellipsoid, dark brown or black. May to June (Plate XI, fig. 4).

In shady rocky places up to 1650 m.—*Western Siberia*: Ob' Region, Irtysh, Altai; *Eastern Siberia*: Angara-Sayan. Endemic. Described from Altai. Type in Berlin?

- 262 20. *S. mandshurica* Maxim. in Bull. Soc. Nat. Mosc. LIV. I (1879) 35; Kom. Fl. Man'chzh. III, 413.—*lc.*: Gorshk. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XIV, 443, fig. 1.

Perennial. Plant 40–70 cm tall. Stems erect, 4-angled, covered with minute brownish glandular hairs. Leaves cordate-ovate, 6–11 cm long, 3–8 cm broad, short-pointed, unequally dentate; petioles 0.5–2 cm long; lower floral leaves broadly lanceolate, 6–8 mm long, 1.5 mm broad, upper similar to bracts, oblong-ovate, 4–5 mm long, 1.7–2 mm broad, both sessile; upper surface of leaves diffusely glandular-pubescent, lower more densely so. Flowers numerous, on glandular-hairy, 1–2.5 mm long pedicels; cymes 3–5-flowered, sessile or with glandular-hairy axillary 2 mm long peduncles, forming compact narrow 17 cm long, 1–2.5 cm broad inflorescence. Bracts ovate, (1.5)4 mm long, 1.7 mm broad, obtuse, glandular-pubescent along with calyx. Calyx 2.5 mm long; lobes ovate, 2 mm long, 1.5 mm broad, subacute, without scarious margin. Corolla 6 mm long, with recurved lobes; lobes of upper lip elliptical, slightly narrowed at base, 2 times as long as lateral lobes of lower lip. Stamens almost equaling corolla or slightly exserted; filaments glandular; staminode linear, almost filiform, obtuse, 5 times as long as broad. Ovary ovoid, 1.2 mm long, 1 mm broad, glabrous, yellowish brown; style 2.5 times as long as ovary. Capsule ovoid, 5–7 mm long, 4.5–5 mm broad, smooth, mucronate. Seeds black, 0.8 mm long, 0.4 mm broad, ellipsoid. June to July.

Possible habitat in regions bordering Zeya-Bureya. Described from Manchuria, from the banks of the Amur River, above the village of Kudyurko. Type in Leningrad.

21. *S. maximowiczii* Gorschk. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XIV (1951) 441.—*S. mandschurica* Maxim. in Bull. Soc. Nat. Mosc. LIV, 1 (1879) 35, p.p.; Kom. Fl. Manchzh. III, 413; Kom. and Alis. Opred. rast. Dal'nevost. kr. II, 919.—*lc.*: Gorshk. l.c. 443, fig. 2.

Perennial. Plant 50–75 cm tall. Stem erect, simple or branched, 4-angled, yellowish brown or brown, glandular puberulent. Leaves ovate or

oblong-ovate, 4–7(12) cm long, 1.5–5.5(7.5) cm broad, with 1.5–2.5 cm  
 265 long petioles; upper leaves lanceolate, 1.8 cm long, 0.6 cm broad, with  
 2 mm long petioles; leaves acute, sharply serrate, upper surface green, sub-  
 glabrous, lower bluish gray, generally densely glandular-pubescent. Inflo-  
 rescence few-flowered, lax, paniculate, 12–31(37) cm long, 8–10(15) cm  
 broad. Bracts linear, 2–5 mm long, acute, half as long as, or some-  
 times equaling calyx, diffusely glandular-pubescent. Flowers numerous;  
 cymes 3–5-flowered with elongated axillary, 1.5–4(7) cm long peduncles;  
 pedicels 0.5–2 cm long; peduncles and pedicels covered with brown gland-  
 ular hairs. Calyx 4–5 mm long, diffusely glandular-hairy, lobes elongated  
 lanceolate, acute, 3.5–4.5 mm long, 0.7 mm broad (in lower part). Corolla  
 0.8–1 cm long, brown, glabrous; lobes of upper lip reddish, oblong-  
 elliptical, 3.5 times as long as lateral lobes of lower lip. Stamens included,  
 filaments glandular-pubescent; staminode obovate or obcordate, narrow at  
 base, emarginate at tip, 2 mm long, 1.5 mm broad. Ovary oblong-ovoid  
 2 mm long, 1.5 mm broad, glabrous; style filiform, 2–2.5 times as long as  
 ovary. Capsule oblong-ovoid, 1 cm long, 5.5 mm broad, smooth, yellow-  
 ish brown, with sharp beak. Seeds ellipsoid, 1 mm long, 0.5 mm broad,  
 dark brown. July.

In deciduous forests, marshy grasslands, on open grassy slopes of hills.  
 As weed along ditches, ravines, roadsides, and field edges.—*Soviet Far  
 East*: Ussuri. *General distribution*: Japan, China. Described from North-  
 eastern China, from the mouth of the Sidemi River. Type in Leningrad.

22. *S. amgunensis* F. Schmidt in Mém. Acad. Sc. Pétersb. VII  
 sér. XII, 2 (1868) 57; Kom. Fl. Manchzh. III, 414; Kom. and Alis. Opred.  
 rast. Dalnevost. kr. II, 918.— *Ic.*: F. Schmidt, l.c. tab. 1, f. 2, 3.

Perennial. Plant 35–80 cm tall. Stem suberect, simple or branched  
 above, glandular-pubescent, hairs white, unicellular. Leaves ovate,  
 4–4.5 cm long, 1.4–1.8 cm broad, short-pointed, sharply dentate, base  
 cuneate, upper surface subglabrous, lower glandular-puberulent, together  
 with the petioles; petioles 2–3 cm long; floral leaves oblong or lanceolate,  
 0.6–1.3 cm long, 2–4 mm broad, remotely and coarsely dentate. Flowers  
 on 0.3–0.5(1) cm long glandular pedicels; cymes 1–3-flowered with  
 0.3–0.7 cm long glandular-pubescent peduncles, forming compact, leafless,  
 10–25 cm long, 2–2.5(3) cm broad paniculate inflorescence. Bracts  
 orbicular, 4 mm long, 2.5–3 mm broad, equaling calyx, with broad white-  
 scarious margin. Calyx 3(4) mm long, glabrous; lobes orbicular, with broad  
 white-scarious margin, 2.5(3) mm long, 3(3.5) mm broad. Corolla green,  
 5(8) mm long, lobes of upper lip 2 times as long as lateral lobes of lower  
 266 lip. Stamens included; filaments glandular; staminode deltoid or obcordate,  
 dentate, slightly broader than long. Ovary ovoid, 1.5 mm long, 1.2 mm  
 broad, glabrous; style twice as long as ovary. Capsule ellipsoid 6.7 mm



long, 4 mm broad, sharp-pointed, glabrous. Seeds ellipsoid, dark brown, 0.6 mm long, 0.4 mm broad. May to June.

On dry stony slopes. Along river banks and pebbly beds of river valleys. *Soviet Far East*: Zeya-Bureya, Uda Region, Ussuri. Endemic. Described from the Amgun River. Type in Leningrad.

Series 7. *Nodosae* Gorschk.—Plants with tuberous or simple thickened rootstock. Calyx 1/4–2/5 as long as corolla.

23. *S. macrobotrys* Ldb. Fl. Ross. III (1847–1849) 217; Grossh. Oprel. rast. Kavk. 308.—*S. nodosa* Boiss. Fl. or. IV, 399, non L. p.p.; Grossh. Fl. Kavk. III, 377.

Perennial. Plant 80–150 cm tall. Stem nearly 4-angled, densely covered with brown glandular hairs. Lower leaves broadly ovate or cordate, 15–20 cm long, 7–8 cm broad, with 5 cm long petioles; middle leaves ovate, 11 cm long, 6 cm broad; floral leaves linear, (1.5)3–7(10) cm long, 0.5–2(5) cm broad; petioles of floral and middle leaves 0.5–0.7 cm long; all leaves acute, oblique, sharply serrate, upper surface subglabrous, lower pubescent, especially along veins. Flowers numerous, on 0.8–1.5 cm long densely glandular-pubescent pedicels; cymes 3-flowered with protruding, glandular-hairy, 1.4 cm long peduncles, forming up to 25(30) cm long, 3.5–4.5 cm broad leafy inflorescence. Bracts linear-subulate or setose, (1.5)2.5–3 mm long, 0.2–0.5 mm broad. Calyx 3 mm long, covered with white simple hairs; lobes ovate or suborbicular, obtuse, 2.5 mm long, 1.8 mm broad, with narrow scarious margin. Corolla glabrous, dark brown, greenish, 7 mm long, 4.5 mm broad; lobes of upper lip orbicular, 3–4 times as long as lateral lobes of lower lip. Stamens included, filaments glandular-pubescent; staminode obovate-orbicular, as long as broad, dark brown. Ovary ovoid, brown, 2 mm long, 1.8 mm broad; style short, 1 1/3–2 times as long as ovary. Capsule ovoid-conical, 8 mm long, 7 mm broad, glabrous, acuminate. Seeds oblong, usually subdeltoid, sometimes curved, dark brown, almost black. June.

269 In middle and upper mountain zones, in forests.—*Caucasus*: western and southern Transcaucasia. *General distribution*: Armenia-Kurdistan. Described from Georgia. Type in Leningrad.

24. *S. nodosa* L. Sp. pl. (1753) 619; M.B. Fl. taur.-cauc. III, 414; Bge. in Ldb. Fl. alt. II, 439; Benth. in DC. Prodr. X, 309; Ldb. Fl. Ross. III, 218; Boiss. Fl. or. IV, 399; Schmalh. Fl. II, 266; O. and B. Fedtsch. Perech. rast. Turkest. 5, 84; Fedtsch. Rast. Turkest. 692; Grossh. Fl. Kavk. III, 377; Kryl. Fl. Zap. Sib. X, 2246.—*S. halleri* Gueldenst. ex Ldb. Fl. Ross. III (1847–1849) 219.—*l.c.*: Rchb. Ic. fl. Germ. XX, tab. 1674; Fedtsch. and Fler. Fl. Evrop. Ross. fig. 794; Syreistsch. Ill. fl. Mosk. gub. III, 132; Hegi, Illustr. Fl. Mittel-Eur. VI, 1 tab. 236, p. 33; Maevsk. Fl. ed. 8, fig. 174;





Viznachn. rosl. USSR. fig. 225.—*Exs.*: Herb. Fl. Cauc. No. 589; Pl. Finl. exs. No. 908, 909; Fl. pol. exs. No. 855; Fl. Boh. and Morav. exs. No. 678.

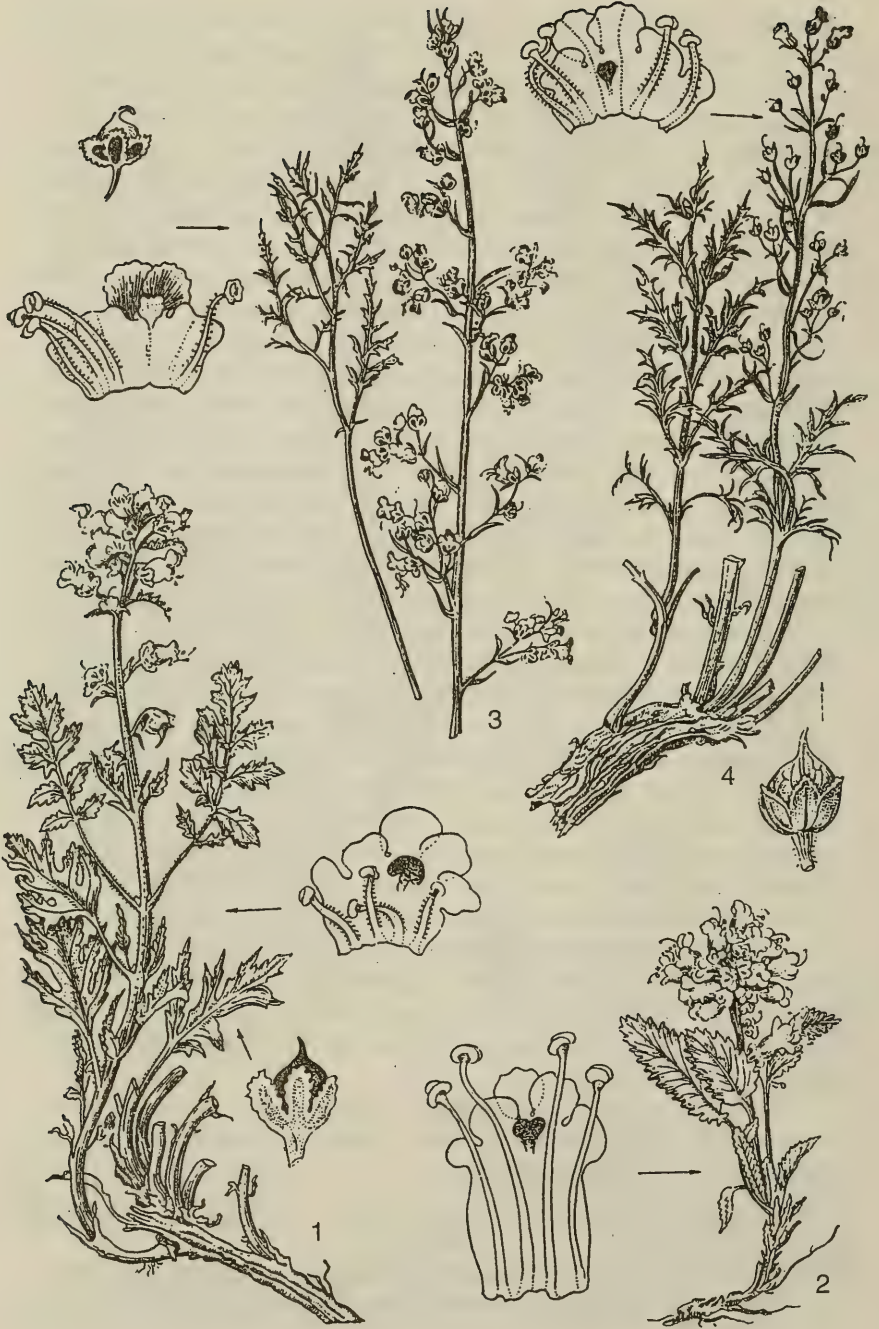
Perennial. Plant 50–125 cm tall, glabrous, sometimes with diffusely glandular-pubescent inflorescence (var. *glandulosa* Nas. in herb.); root-stock tuberously thickened. Stem sharply 4-angled, erect. Leaves ovate, 5–17 cm long, 2–8 cm broad with 1–2.5 long petioles, broadly cordate at base, acute, doubly sharply serrate; floral leaves lanceolate or linear-lanceolate, 0.8–1.3 cm long, 0.5 mm broad. Flowers on 1 cm long pedicels, covered with brown, almost black glandular hairs along with peduncles; cymes 3–4-flowered, with axillary, 1–2 cm long peduncles, forming oblong, pyramidal, lax and somewhat narrow, 15–45 cm long, 5–7 cm broad inflorescence. Bracts linear, 1–2 mm long, 0.2 mm broad, acute, 1/10–1/5 as long as pedicels. Calyx 1.7–2.5 mm long, glabrous; lobes broadly ovate, obtuse, with narrow white-scarious margin, 1.8 mm long, 1.5 mm broad. Corolla 7–9 mm long, dark, olive green or brownish green, tube and lower part of limb generally green, upper part and spine brownish; lobes of upper lip 2 times as long as lateral lobes of lower lip. Stamens included; filaments glandular-pubescent; staminode obreniform, slightly emarginate above, 2 times as broad as long. Ovary ovoid, 1.5 cm [sic!] long, 1.2 cm [sic!] broad; style 2 times as long as ovary. Capsule glabrous, greenish brown, globose or broadly ovoid, 5–8 mm long, 4–6 mm broad, pointed. Seeds ellipsoid, 0.7 mm long, 0.4 mm broad, dark brown. May to August.

In coniferous and mixed forests, among shrubs, in mixed-fodder grasslands and in damp and dry valleys; also on mountains up to 2200 m. As weed in rye crops, in neglected pastures, logged areas and near ditches.—*European USSR*: Karelian Lapland, Dvina-Pechora, Baltic Region, Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Trans-Volga Region, Upper Dniester, Bessarabia, Black Sea Region, Crimea, Lower Don, Lower Volga; *Caucasus*: Ciscaucasia, western and eastern Transcaucasia, Talysh; *Western Siberia*: all regions; *Eastern Siberia*: Yenisey, Angara-Sayan. *General distribution*: Scandinavia, Central and Atlantic Europe, Mediterranean Region, Balkan States-Asia Minor, North America (Canada). Described from Western Europe. Type in London.

*Economic importance.* Nectariferous plant used in home remedies. Poisonous to cattle and horses. Its roots contain the alkaloid scrophularine (Kolakovskii, Fl. Abkhazii IV, 96).

#### Plate XI.

1. *Scrophularia heucheriflora* Schrenk, portions of plant; section of corolla.—2. *S. ilvensis* C. Koch, portion of plant, section of corolla, capsule.—3. *S. oldhami* Oliver, inflorescence, section of corolla.—4. *S. altaica* Murr., inflorescence, leaf, capsule, section of corolla.





25. *S. oldhami* Oliver in Journ. Linn. Soc. IX (1867) 167; Kom. Fl. Man'chzh. III, 415; Kom. and Alis. Oprod. rast. Dalnevost. kr. II, 918. —*lc.*: Useful, Pl. Jap. II, tab. 443; Somoku-Dzusetsu, ed. 2, XI, tab. 55.

Perennial. Plant 80 cm tall. Stem erect, simple, glabrous, 4-angled. Leaves ovate-lanceolate; lower leaves ovate, 4–9.5 cm long, 2–5.5 cm broad, acute, base rounded, or subcuneate, serrulate, petioles 0.7–2 cm long; upper leaves 1.8–3.5 cm long, 0.8–1.8 cm broad, subsessile, petioles 0.3–0.5 cm long; floral leaves oblong, 0.6–0.9 cm long, 2 mm broad, with elongated apex, margin sparsely and coarsely subdentate. Flowers on glandular, 5–6 mm long pedicels; cymes single-flowered with 2–3 mm long, glandular-pubescent peduncles forming narrow, dense, leafless, 9–40 cm long, 1.5–3 cm broad, spicate inflorescence. Bracts lanceolate, 3.5 mm long, 1.5 mm broad, acute. Calyx glabrous, 2.5–3 mm long; lobes ovate or ovate-orbicular, 2–2.5 mm long, 1.5 mm broad, margin scarious. Corolla 0.7–1 cm long; lobes of upper lip orbicular, 2 times as long as lateral lobes of lower lip. Stamens included; filaments glandular; staminode obovate-spatulate or orbicular, slightly longer than or as long as broad, narrowed at base. Ovary ovoid, 1.5 mm long, 1.2 mm broad, glabrous; style 2 times as long as ovary. Capsule ellipsoid, 5–6(9) mm long, 3.5–4(6) mm broad, smooth, acuminate. Seeds ellipsoid, 0.8 mm long, 0.4 mm broad. July (Plate XI, fig. 3).

(Flood-plain) meadows and damp valley grasslands.—*Soviet Far East*: Zeya-Bureya (Sungari River), Ussuri (Furuhelm Island).—*General distribution*: Japan, China. Described from Nagasaki. Type in London.

Series 8. *Alatae* Gorschk.—Stems and petioles winged.

26. *S. alata* Gilib. Fl. lith. I (1781) 127, non A. Gray; Boiss. Fl. or. IV, 399; Schmalh. Fl. II, 266; Grossh. Fl. Kavk. III, 376.—*S. aquatica* auct. non L.: Ldb. Fl. Ross. III, 218; Kryl. Fl. Zap. Sib. X, 2427.—*S. ehrharti* Steven in Ann. Nat. Hist. ser. 1, V (1840) 3.—*lc.*: Rchb. Ic. fl. germ. XX, tab. 1672; Coste, Fl. fr. III, 7; Syreistsch. III, Fl. Mosk. gub. III, 133; Hegi, 271 Illustr. Fl. Mittel-Eur. VI, 1, 33.—*Exs.*: Fl. gall. and germ. exs. No. 2718 and No. 12; Fl. Ital. exs. No. 1928; Fl. Boh. and Morav. exs. No. 679; Fl. exs. Reipubl. Boh.-Slov. No. 1173.

Perennial. Plant 40–120 cm tall, glabrous, with fibrous roots. Stem 4-angled, angles and petioles broadly or narrowly winged (*β. cordata*

#### Plate XII.

1. *Scrophularia ruprechtii* Boiss., general appearance of plant, capsule, section of corolla.—2. *S. minima* M.B., general appearance of plant, section of corolla.—3. *S. xanthoglossa* Boiss., portion of inflorescence, leaf, section of corolla, capsule'. —4. *S. multicaulis* Turcz., general appearance of plant, section of corolla, capsule.



Boiss.). Leaves oblong-ovate, 7–9 cm long, 3.5–4 cm broad, petioles 1 cm long; lower leaves 10–16 cm long, 4.5–7.5 cm broad, sometimes cordate (*β. cordata* Boiss.), somewhat acute, base rounded or subcordate, serrate or crenate-serrate, petioles 5 cm long; floral leaves lanceolate or linear, 1–3 cm long, 0.2–1.5 cm broad. Flowers on glandular-pubescent (0.3)0.7–1 cm long pedicels; cymes 3-flowered with glabrous, 0.5–1 cm long peduncles, forming oblong, leafless, 16–26 cm long, 5–9 cm broad panicle inflorescence. Bracts oblong-linear, 3.6 mm long, 0.3–0.5 mm broad, acute. Calyx glabrous, 2–2.5(3) mm long, parted up to 2/3; lobes orbicular, 1.8–2.3 mm long, 2 mm broad, with broad scarious margin. Corolla greenish-reddish brown, 4–6 mm long, lobes of upper lip, spine and lateral lobes of lower lip generally brownish red, tube and the middle lobe green; lobes of upper lip orbicular, 2 times as long as lateral lobes of lower lip. Stamens included; filaments glandular; staminode obcordate-bilobate, lobes divaricate, 1/3 as long as broad or depressed (*β. cordata* Boiss.). Ovary ovoid, glabrous, 1 mm long, 0.7 mm broad; style 3 times as long as ovary. Capsule globose-ovoid or subglobose, pointed, 5 mm long, 4 mm broad, smooth. Seeds dark brown, ellipsoid, 0.7 mm long, 0.5 mm broad. June to September.

In coniferous and mixed forests, damp meadows; in gardens, near irrigation canals and in old fields—*European USSR*: Baltic Region, Upper Volga, Volga-Kama (near Kazan), Upper Dnieper, Middle Dnieper, Volga-Don, Bessarabia, Black Sea Region, Crimea, Lower Don: *Caucasus*: Ciscaucasia, western, eastern and southern Transcaucasia, Talysh; *Western Siberia*: Irtysh, Altai; *Eastern Siberia*: Angara-Sayan (Achinsk plain, in the village of Dubinino; Anash settlement); Aral-Caspian Region, Balkhash Region, Dzh.-Tarbagatai, Syr Darya, Pamiro-Alai, Tien Shan. *General distribution*: Central and Atlantic Europe, Mediterranean Region, Balkan States—Asia Minor, Armenia-Kurdistan, Iran, Tibet. Described from Grodno. Type in Kiev.

*Note.* *S. alata* Gilib is often confused with *S. aquatica* L., which is widely distributed in Southern Europe. It is easily distinguished from the latter by its leaves with a serrate or crenate-serrate margin (not crenate), and obcordate-bilobate staminode, often with divaricate lobes (not orbicular-reniform, slightly emarginate).

27. *S. grayana* Maxim. ex Kom. Fl. Man'chzh. III (1907) 416; Kom and Alis. Oprod. rast. Dal'nevost. kr. II, 919.—*S. alata* A. Gray in Mém. Am. Acad. N. S. VI (1858–1859) 401, non Gilib.— *Ic.*: Sugawara, Illustr. 272 Fl. Sagh. IV, tab. 744; Somoku-Dzusetsu, ed. 2, XI, tab. 56.

Perennial. Plant up to 1 m tall. Stem erect, branched above, 4-angled, angles usually narrowly winged, sparsely covered with simple, white, unicellular hairs. Leaves oblong-ovate, (7)10–15 cm long, 3.5–7 cm broad,

acute, sharply serrate, generally cordate, upper surface glabrous, lower more or less pubescent along veins, petioles winged, 1–2 cm long; floral leaves lanceolate, 2–5 cm long, 0.7–1.5 cm broad, with 2–5 cm long petioles. Flowers on densely glandular-pubescent, 1–1.8 cm long pedicels; cymes 3-flowered, with glabrous, 2.5–3 cm long peduncles, forming paniculate, lax (6)16–45 cm long, (4)9–18 cm broad many-flowered inflorescence. Bracts narrowly lanceolate or linear, acute,  $1/3$ – $1/2$  as long as pedicels. Calyx 2.5–3(4) mm long, deeply parted; lobes orbicular, with scarious margin, 2(3) mm long, 2(2.5) mm broad. Corolla reddish brown, 0.8–1 cm long; lobes of upper lip elliptical, 2–3 times as long as lateral lobes of lower lip. Stamens included; filaments diffusely glandular-pubescent; staminode obovate-orbicular, petaloid, slightly longer; sometimes as long as broad (rarely broader than long), narrowed at base, palmately veined. Ovary ovoid; style thrice as long as ovary. Capsule ovoid-globose, 8 mm long, 6 mm broad, glabrous, dark brown, acuminate. Seeds black, 1 mm long, 0.7 mm broad. May.

Along sea coasts and in osier beds along river banks.—*Soviet Far East*: Ussuri, Sakhalin. *General distribution*: Japan, China (Northeast). Described from Hakodate. Type in Leningrad.

28. *S. czernjakowskiana* B. Fedtsch. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XIV (1951) 436.

Perennial. Plant 60–120 cm tall, glabrous, with oblique, rather thick, 0.8 cm broad rootstock. Stems solitary or many, erect, narrowly winged along angles. Leaves oblong-ovate, 8–10(13) cm long, 6–7(9) cm broad, obtuse, crenate, with 2–4 cm long petioles; floral leaves similar, 5.5 cm long, 3.5 cm broad, with 1.5 cm long petioles, upper floral leaves linear-lanceolate, 1.3 cm long, 0.2–0.7 cm broad. Flowers on glandular-pubescent, 2–4 mm long pedicels; cymes 3–10-flowered with axillary, 0.5–2 cm long peduncles, forming lax, branched (8)14–21(25) cm long, (2.5)4–12 cm broad, paniculate inflorescence. Bracts linear-filiform, 2–4 mm long, 0.5 mm broad. Calyx (2)2.5 mm long, glabrous; lobes elliptical, 1.5 mm long, 0.5 mm broad, with narrow white-scarious margin. Corolla greenish yellow, 4.5 mm long; lobes of upper lip orbicular, sinuate  
273 above, narrow in lower part, 2 times as long as lateral lobes of lower lip. Stamens included; filaments glabrous or diffusely glandular-pubescent; staminode reniform, emarginate above, 3 times as broad as long. Ovary oblong-ovoid, 2 mm long, 1.5 mm broad, glabrous; style  $1\frac{1}{3}$  as long as ovary. Capsule oblong-ovoid, 5 mm long, 4 mm broad, acuminate, smooth. Seeds ellipsoid, 0.7 mm long, 0.4 mm broad, dark brown. May to June.

In lower mountain zone, along rivulets and near springs.—*Soviet Central Asia*: mountainous Turkmenia. Endemic. Described from the ravine and Tutly spring near Firyuza. Type in Leningrad.

Section II. *Tomiophyllum* Benth. in DC. Prodr. X (1846) 310.—Plants very sparsely leafy. Leaves 2–8(11) cm long, 1–4(7.5) cm broad, with poorly developed lamina, pinnate or usually bipinnate, or multi-pinnatisect, rarely entire, coarsely crenate, almost incised or incise-dentate, with veins not anastomosed, or sometimes anastomostic only in certain leaves.

Subsection 1. *Orientales* Stiefelhag. in Bot. Jahrbüch. 44 B (1910) 468.—Corolla lobes equal. Staminode absent.

29. *S. orientalis* L. Sp. pl. (1753) 620; Ldb. Fl. Ross. III, 215; Boiss. Fl. or. IV. 392; Bordzil. in Sb. pam. A.V. Fomina, 62; Grossh. Fl. Kavk. III, 374.—*S. ebulifolia* M.B. Fl. taur.-cauc. II (1808) 77.—*Ic.*: Jaub. and Spach, Illustr. pl. or. III. tab. 221.

Perennial. Plant 60–100 cm tall. Stems numerous, green, erect, virgate, projecting, covered with scattered, brown, glandular hairs. Leaves generally whorled, ovate or oblong-lanceolate; lower and middle leaves 2.5–8(11) cm long, 0.6–4 cm broad, somewhat incised at base, lobes deltoid or almost lanceolate, 0.4–2.5 cm long, 0.2–0.6 cm broad, generally oblique, serrate; upper leaves lanceolate or oblong-lanceolate, entire or slightly incised or cauline leaves pinnatisect, 8–10.5 cm, with 1–3 lateral, linear-lanceolate, 0.3–4 cm long and 0.3–0.7 cm broad segments, the terminal segment larger, 4.5–5 cm long, 1.1 cm broad, incise-serrate (var. *pinnatifolia* Bordz.); floral leaves linear, almost filiform, 0.3–1 cm long, 0.7 mm broad; all leaves thin, rugose, acute, lower surface glandular-pubescent along veins. Flowers numerous, on 0.2–1 cm long, filiform pedicels; cymes 2–5-flowered with 0.5–2 cm long, glandular-pubescent peduncles, forming paniculate-pyramidal. 2–10 cm long, 4 cm broad oblong inflorescence. Bracts subulate or filiform, equaling or 1/5 as long as pedicels. Calyx glabrous, (2)2.5–2.8 mm long; lobes ovate-orbicular, (1.8)2.3 mm long, 2–2.5 mm broad, with white-scarious margin. Corolla spheroid, 3.8–5 mm long, yellowish green outside, generally violet or with purple stripes at base; lobes of upper lip orbicular, narrowed at base, almost equaling or slightly shorter than lateral lobes of lower lip. Stamens exserted; filaments glandular-pubescent. Ovary ovoid-pyramidal, 1 mm long, 1.5 mm broad; style 3–4 times as long as ovary. Capsule ovoid pyramidal, 6 mm long, 5 mm broad, acuminate, glabrous. Seeds ellipsoid, 1.3 mm long, 0.7 mm broad, black. May to June.

In middle mountain zone; along forest edges, on subalpine grasslands, banks of rivers and lakes.—*Caucasus*: Ciscaucasia, Dagestan (Kazikumuk), eastern (Akhalsikhe) and southern Transcaucasia. *General distribution*: Armenia-Kurdistan. Described from Armenia. Type in London.

30. *S. nervosa* Benth. in DC. Prodr. X (1846) 303; Boiss. Fl. or. IV, 392; Bordzil. in Sb. pam. A.V. Fomina, 62; Grossh. Opred. rast. Kavk.



307.—*S. olivieri* Jaub. and Spach, Illustr. pl. or. III (1847–1850) 29.— *Ic.*: Jaub. and Spach, l.c. tab. No. 222.

Perennial. Plant 40–50 cm tall, generally puberulent. Stems erect, virgate, almost violet, canescent, covered with white, short, soft, simple hairs, especially in upper part. Leaves oblong-lanceolate, thin, entire, serrulate; floral leaves narrowly lanceolate or linear; all leaves acute, distinctly veined, both surfaces pubescent, lower surface tomentose along veins, petioles short. Flowers numerous, on slender, glandular-pubescent, 3–7 mm long pedicels; cymes 3–7-flowered with 0.7–1 cm long, glandular-pubescent peduncles, forming paniculate, pyramidal, lax inflorescence. Bracts subulate. Calyx densely glandular-pubescent, 1.5 mm long; lobes elliptical, obtuse, unequal, with narrow scarious margin. Corolla spheroid, 3.5–4 mm long, bluish-violet; lobes of upper lip orbicular, slightly shorter than lateral orbicular broader lobes of lower lip. Stamens exerted; filaments glandular-pubescent. Ovary ovoid, glabrous; style 3 times as long as ovary. Capsule ellipsoid, smooth, mucronate. Seeds ellipsoid, 0.7 mm long, 0.5 mm broad, dark brown. May to June.

In the middle mountain zone on dry slopes.—*Caucasus*: Eastern Transcaucasia (near Ordubad). *General distribution*: Iran. Described from Iran from Mt. Alwand, near Hamadan. Type in London.

*Note*. Only the var. *Schelkovnikovii* Bordz. is found in our country.—  
275 Plant 40–47 cm tall with numerous stems. Leaves lanceolate, coarsely serrate, 3.7–4.9 cm long, 1–1.5 cm broad, with 4–5 mm long petioles; leaves on terminal branches oblong- or linear-lanceolate. Calyx 3–3.5 mm long. Corolla 5.5–6.5 mm long.

Subsection 2. *Lucidae* Stiefelhag. in Bot. Jahrbüch. 44 B (1910) 468.—Lobes of upper corolla lip exceeding lateral lobes of lower lip.

Series 1. *Pycnanthium* Boiss. Fl. or. IV (1879) 388, pro sect.—Staminate node obcordate,  $\frac{2}{3}$  as long as broad. Inflorescence capitate or ovoid, dense. Plants annual [sic!], glabrous.

31. *S. minima* M.B. Fl. taur.-cauc. II (1808) 79; Benth. in DC. Prodr. X, 303; Ldb. Fl. Ross. III, 215; Boiss. Fl. or. IV, 393; Grossh. Fl. Kavk. III, 374.—*S. pumila* Adams ex Ldb. Fl. Ross. III (1846–1851) 215.

Perennial. Plant 2–10(13) cm tall. Leaves ovate or oblong, 2–4.5 cm long, 0.5–1(1.5) cm broad, subacute, with cuneate base, simple, subdentate or doubly dentate, with 3 cm long petioles; floral leaves linear, 5 mm long, 0.7 mm broad, acute, entire; all leaves covered with scattered minute glandular hairs. Flowers sessile or on 1 mm long glandular-pubescent pedicels, 1–2 cm long peduncles, forming dense, 2–3 cm long, 1.8–2.5 cm broad capitate or ovoid inflorescence. Bracts narrowly lanceolate-linear, 3 mm long, 0.3 mm broad. Calyx glabrous, 4–4.5 mm long; lobes ovate, 2 mm long, 2.2 mm broad, obtuse, with crispate-undulate scaly margin,



suberose. Corolla purplish pink, 1.2 cm long, tubular; lobes of upper lip orbicular,  $1\frac{1}{3}$  times as long as lateral lobes of lower lip. Stamens exserted, filaments glabrous; staminode obcordate,  $\frac{2}{3}$  as long as broad, with a small notch in upper part. Ovary ovoid, 1.5 mm long, 1.3 mm broad, glabrous; style 6 times as long as ovary or longer. Capsule ovoid, 7–8 mm long, 5–6 mm broad, mucronate, glabrous. Seeds oblong-ellipsoid, yellowish brown, 1.2 mm long, 0.5 mm broad. June to August (Plate XII, fig. 2).

In alpine belt, on rubbly talus areas or moraines and near glaciers. *Caucasus*: Ciscaucasia, Dagestan, eastern Transcaucasia. Endemic. Described from Georgia. Type in Leningrad.

Series 2. *Rupestres* Gorschk.—Staminode oblong-ovate, deltoid-spatulate or cordate-rhomboid, as long as or slightly longer than broad. Lobes of upper corolla lip 2 times as long as lateral lobes or lower lip.

32. *S. sareptana* Kleopov in Maevsk. Fl. ed. 7-e (1940) 642.

Perennial. Plant 15–40 cm tall, with woody rootstock. Stems numerous, 4-angled, sometimes woody at base, densely white glandular-puberulent. Leaves oblong, 1.7–3 cm long, 0.7–1.3(1.5) cm broad, subacute, narrowed at both ends, incise-serrate or coarsely serrate, with 0.5–1 cm long petioles; floral leaves linear, entire, 0.5–1.5 cm long, 0.1–0.3 cm broad; both surfaces and petioles of all leaves white glandular-pubescent. Flowers numerous, on 1.5–3 mm long pedicels densely covered with brown glandular hairs; cymes 1–3-flowered with axillary glandular-hairy 0.7–1.5 cm long peduncles, forming oblong (6)10–20 cm long, 2–4 cm broad panicle inflorescence. Bracts linear, acute, half as long as calyx, diffusely glandular-pubescent. Calyx 2 mm long, covered with scattered, brown and white glandular hairs; lobes orbicular, 1.8 mm long, 1.5 mm broad, with broad, white scarious margin. Corolla brownish-red, 3.5–5 mm long, 2.5–4 mm broad; lobes of upper lip orbicular, narrowed at base, red, 2 times as long as brownish yellow lateral lobes of lower lip. Stamens included, filaments glandular-pubescent; staminode ovate, yellowish, subacute,  $1\frac{1}{3}$  times as long as broad. Ovary globose, 1 mm long, 1.2 mm broad, yellowish brown; style 3–4 times as long as ovary. Capsule globose, 4 mm long, 4.5 mm broad, brown, smooth, shortly mucronate. Seeds oblong-ellipsoid, 1.3 mm long, 0.6 mm broad, dark brown. May.

In limestone mountains, limestone and sandy cliffs along river banks.—*European USSR*: Volga-Don, Lower Don, Lower Volga. Endemic. Described from Krasnoarmeisk. Type in Leningrad.

33. *S. donetzica* Kotov in Bot. zhurn. URSR, I, 2 (1940) 298; in Vzn. rosl. URSR, 379.—*S. rupestris* auct. non M.B.—*l.c.*: Kotov in Bot. zhurn. URSR, I, 2, 298; fig. 1.

Perennial. Semishrub. 10–50 cm tall, glandular-puberulent, except corolla and upper surface of leaves. Rootstock branched, woody, 1 cm in diameter. Stems erect or ascending, brown or reddish at base. Leaves oblong, with cuneate base, 2.5–3.5(4) cm long, 1 cm broad, upper surface sometimes and lower always densely glandular-puberulent, coarsely pin-natisect; segments lanceolate or linear-lanceolate, 1.2 mm long, 0.7–1 mm broad, incise-dentate; floral leaves elliptic-linear, 2–8 mm long, 0.3–1 mm broad, coarsely dentate. Flowers numerous, on slender, 2–2.5(4) mm long pedicels; cymes 1–3(rarely 5)-flowered with 5–8 cm long peduncles, forming narrow paniculate, 10–25 cm long and 2–5 cm broad inflorescence. Bracts linear, 1 mm long, 0.3 mm broad, pubescent. Calyx 1.2 mm long, glandular-puberulent, lobes orbicular, 0.9 mm long and broad, with broad scarious margin. Corolla yellowish, glabrous, 3–4 mm long; lobes of upper lip dark red, orbicular, narrowed at base, 2 times as long as lateral lobes of lower lip. Stamens exserted, filaments glandular; staminode deltoid-spatulate, obtuse, dark red, slightly longer than broad. Ovary globose, 1–1.2 mm long, 1 mm broad, yellowish brown; style almost 3 times as long as ovary. Capsule compressed globose, 3 mm long and broad, glabrous, yellowish brown, with 0.5–1 mm long beak. Seeds oblong, obtuse, straight or slightly curved, dark brown or black, 1.2–1.7(2) mm long, 0.7–1 mm broad. July to August.

On shale and its debris.—*European USSR*: Lower Don. Endemic. Described from Stalino Region, Amvrosievsk District, village of Blagodatnoe. Type in Kiev.

34. *S. rupestris* M.B. ex Willd. Sp. pl. III (1800) 274; Fl. taur.-cauc. II, 79; Benth. in DC. Prodr. X, 315; Grossh. Fl. Kavk. III, 378.—*S. saxatilis* Boeb. ex Ldb. Fl. Ross. (1846–1851) 221.—*S. variegata* M.B. var. *rupestris* Boiss. Fl. or. IV (1879) 417; Somm. and Lev. in Tr. Bot. sada, XVI, 368; Schmalh. Fl. II, 267.—*lc.*: Rchb. Ic. pl. crit. III, tab. 258.—*Exs.*: GRF, No. 1125.

Perennial. Plant 10–30 cm tall, all parts, except flowers, densely covered with glandular, white and sometimes brown hairs. Stems numerous, simple or sparingly branched, brown or reddish dark violet. Leaves oblong or ovate, 1.5–3.5 cm long, 0.6–1.5 cm broad, irregularly dentate, almost incised or incise-serrate, narrowed at base, with 0.3–1 cm long petioles; floral leaves 4–9 mm long, 0.5–1.5 mm broad, sessile, the lower in inflorescence lanceolate, regularly dentate, upper linear, entire or all leaves 2 cm long, 6–7 mm broad, lanceolate or lanceolate-linear (var. *microphylla* Somm. and Lev.). Flowers on 1–2 mm long pedicels; cymes 1–5-flowered, with 0.5–1 cm long peduncles, forming oblong, sparse, pyramidal, paniculate, 6–16 cm long, 1–2.5 cm broad, nearly leafless inflorescence. Bracts lanceolate-linear, 1–1.5 mm long,

0.3 mm broad, acute. Calyx glabrous, 2–2.5 mm long; lobes orbicular, with broad scarious margin, obtuse, 1.3 mm long, 2 mm broad. Corolla yellowish, (4)5–6(6.5) mm long; upper lip dark red, lobes orbicular, narrowed at base, 2 times as long as lateral lobes of lower lip. Stamens exserted, filaments diffusely glandular-pubescent; staminode oblong-ovate, as long as, or slightly longer than broad. Ovary pyramidal-ovoid, 1 mm long, 1.5 mm broad, glabrous; style 4 times as long as ovary. Capsule globose, 4–5 mm long, acuminate, yellowish brown, smooth. Seeds  
 278 oblong-ellipsoid, sometimes slightly curved, 1 mm long, 0.5 mm broad, yellowish brown. June.

Steppes, rocky slopes in middle mountain zone. *European USSR*: Crimea, Lower Don; *Caucasus*: Ciscaucasia, western, eastern and southern Transcaucasia. *General distribution*: Armenia-Kurdistan. Described from Crimea. Type in Leningrad.

35. *S. goldeana* Juz. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR XIV (1951) 32.—*S. rupestris* auct. fl. taur. p.p. non M.B.—*Exs.*: GRF, No. 1125.

Perennial. Plant with numerous, erect, densely leafy stems, 25–50 cm tall, simple or branched above, sulcate, covered with scattered, very minute, glandular hairs, almost like a bloom, often turning lilac colored. Leaves ovate or narrowly ovate, lamina 1–3 cm long, 0.5–1.5 cm broad, narrowed at base, subobtuse or rather acute at apex, with a few (3–5) large and irregular upward directed, obtuse or orbicular teeth or lobes, most of them in turn having 1–3(4) serrations on the outer side and 0(1) on the inner side; leaves with diffuse or sparse puberulence appearing like a bloom on both surfaces; petioles 6 mm long. Inflorescence profusely branched, 12 cm long, 3–4 cm broad, branchlets mostly short and few-flowered, erecto-patent, with rather large flowers. Calyx 3–5 mm long; lobes orbicular with white-scarious margin, 2–4 mm long, 1.2 mm broad. Corolla blackish red, 5–10 mm long, lobes of upper lip 1.5 times as long as lateral lobes of lower lip. Stamens exserted, filaments diffusely glandular-pubescent; staminode cordate-rhomboid,  $1\frac{1}{3}$  times as long as broad, glabrous; style 4 times as long as broad. Ovary pyramidal-ovoid, 1.5 mm long and broad, glabrous; style 4 times as long as ovary. Capsule globose, 4–6 mm long, 4–5 mm broad, smooth, subacute. Seeds 1 mm long, black. June to July.

Stony debris on high *yailas* [mountain pastures in Crimea]. *European USSR*: Crimea. Endemic. Described from Crimea, from the *yaila* near Ai-Petri. Type in Leningrad.

*Note*. The author distinguishes his species from *S. rupestris* M.B. by larger flowers and the characteristic leaf dentation.



36. *S. charadzei* Kem.-Nath in Fl. Gruz. VII (1952) 529 (in Georgian language).—*l.c.*: Kem.-Nat. l.c. fig. 342.

Perennial. Plant 10–25 cm tall, covered, except flowers, with white and broad glandular hairs. Root 1.5–2.5 cm in diameter, straight. Stems slender, numerous, erect or procumbent, brown, more or less branched. Leaves ovate or oblong-ovate, (1.5)2.2–2.4 cm long, 0.9–1.4 cm broad, with cuneate base and 6 mm long petioles, irregularly coarsely crenate; floral leaves elliptical, 3–5 mm long, 1–4 mm broad, sessile, with 1–2 teeth along both sides. Flowers on 0.4–1 cm long pedicels, densely glandular-pubescent, in a lax 12 cm long raceme or panicle. Calyx glabrous, 2 mm long, 2.5 mm broad; lobes orbicular, 1 mm long, 1.7 mm broad, with broad white-scarious margin. Corolla yellowish green or greenish red, 4.5–5 mm long; lobes of upper lip 2 times as long as lateral lobes of lower lip. Stamens exserted, filaments diffusely glandular-pubescent; staminode obovate or almost orbicular, as long as broad. Ovary globose, 1 mm long and broad; style 3 times as long as ovary. Capsule broadly ovoid or globose, 4–6 mm long and broad, with a 1–1.5 mm long beak. Seeds not known. July.

Subalpine belt, on rocks. *Caucasus*: Ciscaucasia. Endemic. Described from Akhalkhevi, Tsei-Lamskii Range. Type in Tbilisi.

37. *S. imerethica* Kem.-Nath. in Fl. Gruz. VII (1952) 529 (in Georgian language). —*l.c.*: Kem.-Nat. l.c. fig. 343.

Perennial. Plant 20–60(80) cm tall, covered, except leaves on the main stem and flowers, with white and brown glandular hairs. Root straight, thick. Leaves with large, obtuse, rounded teeth, broadly ovate on the main stem, 2–3 cm long, 1.1–2.5 cm broad, with narrowly winged 3–4 mm long petioles, other leaves 1.5 cm long, 0.8 cm broad, broadly ovate or lanceolate, with 2–3 mm long petioles; floral leaves 8 mm long, 4 mm broad, sessile. Inflorescence paniculate; cymes few-flowered, flowers on somewhat thick, 3 mm long pedicels, densely brown-glandular-pubescent. Calyx glabrous, 2–2.5 mm long; lobes ovate, obtuse, 1.5–1.7 mm long, with white-scarious margin. Corolla greenish or yellowish red. Stamens exserted; staminode obovate. Capsule glabrous, shortly ovoid, 4 mm long, 4.5 mm broad, with a short, 0.5 mm long beak. June to August.

On rocky and dry slopes of the middle mountain zone.—*Caucasus*: western Transcaucasia (Chiatura Region). Endemic. Described from Dzhrucha Ravine, near settlement of Darkveti. Type in Tbilisi.

Series 3. *Atropatanae* Gorschk. —Staminode squarish or reniform. Corolla sometimes diffusely glandular-pubescent outside; lobes of upper lip 2–3 times as long as lateral lobes of lower lip.



38. *S. atropatana* Grossh. Opred. rast. Kavk. (1949) 309, nom. seminud.; in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XIII, 21.—*S. heterophylla* auct. non Willd.—*S. urvilleana* auct. non Dcne.

Biennial. Plant light green, 20–30(40) cm tall, covered with scattered, white, minute, unicellular, glandular hairs (except ovary and capsule).  
 280 Stems more or less 4-angled, generally divaricate, branched, dark purple in lower part. Leaves ovate or oblong (1.4)2–3.5 cm long, (1.2)1.4–2(2.5) cm broad, coarsely crenate or sometimes incised; with 0.5–1.5 cm long petioles; floral leaves linear, 0.3–1 cm long, 0.5–1.5 mm broad, sessile, subacute. Flowers on 1.5 mm long pedicels; cymes 2–3-flowered with axillary, 1.5–2 cm long peduncles forming lax paniculate, 3.5–25 cm long, 0.8–4.5 cm broad inflorescence. Bracts linear, 1 mm long. Calyx 1.8 mm long; lobes elliptical, obtuse, with fimbriate margin, 1.5 mm long, 0.8–1 mm broad. Corolla 3–3.7 mm long, 3 mm broad, dark purple, diffusely glandular-pubescent outside; lobes of upper lip orbicular, slightly narrowed at base, 2 times as long as lateral lobes of lower lip, the latter whitish in upper part. Stamens exserted, filaments diffusely glandular-hairy; staminode 0.5 mm long, 0.3 mm broad, squarish, whitish or yellowish. Ovary 0.7 mm long and broad, globose, smooth; style 5 times as long as ovary. Capsule globose, glabrous, brown or dark brown, 3.5–4 mm long and broad, with a slender, 2 mm long beak. Seeds oblong, dark brown, almost black, 1–1.3 mm long, 0.5 mm broad. May.

Dry stony and rubbly slopes in the lower and middle mountain zone.—*Caucasus*: Southern Transcaucasia. Endemic. Described from Shakhbuz Region, Kyzyl-Bogaz Ravine. Type in Leningrad.

*Note.* A.A. Grossheim assumes that *S. atropatana* is identical to *S. haemathantha* Boiss. var. *crenata* Bordz. (the plant is not available in the herbarium of the Botanical Institute, Akad. Nauk SSSR), but *S. atropatana* is distinguished from the latter by a smaller calyx, pubescent corolla and entire staminode (not sinuate or bilobed).

39. *S. nachitschevanica* Grossh. Opred. rast. Kavk. (1949) 310; in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XIII, 20.

Biennial. Plant glabrous, green, 30–40 cm tall. Stems numerous, branched from the lower third portion. Leaves lanceolate or oblong, (1)2.5 cm long, (0.3)0.4–1.2 cm broad, tapering toward the apex, acute, margin sharply dentate, rarely entire, green, lower leaves with 1–1.5 cm long and upper with 0.2–0.5 cm long petioles; floral leaves lanceolate, 0.2–1(1.5) cm long, 0.5–2.5(3.5) mm broad, entire, dentate in lower part of inflorescence. Flowers sessile or on glandular-pubescent, 1.3–1.5 mm long, pedicels; cymes 1–3-flowered, with common axillary, 0.5–1 cm long, peduncles, forming lax, leafless, 30–40 cm long, 3–6 cm broad inflorescence starting from near the base. Bracts lanceolate-linear, 1–2 mm

long, subacute. Calyx glabrous, 1.8 mm long; lobes broadly orbicular, with narrow fimbriate margins, 1.5 mm long, 1.3 mm broad. Corolla dark purple, 4–4.5 mm long, 3 mm broad; lobes of upper lip orbicular, narrowed toward base, 3 times as long as lateral lobes of lower lip.

281 Stamens exserted, filaments diffusely glandular; staminode reniform, narrowed at base, as long as, or slightly shorter than broad, brownish or brownish purple. Ovary globose, 1 mm long and broad, glabrous; style 4–5 times as long as ovary. Capsule compressed globose, 2.5–3 mm long, 3–3.5 mm broad, glabrous, yellowish, with slender beak. Seeds oblong, 0.8 mm long, 0.4 mm broad, dark brown, almost black. May to August.

In the lower mountain zone, on dry stony slopes.—*Caucasus*: Southern Transcaucasia. Endemic. Described from Nakhichevan ASSR, Shakhbuz Region. Type in Leningrad.

Series 4. *Frigidae* Gorschk.—Staminode deltoid-orbicular, orbicular or obovate. Lobes of upper lip 2–2.5 times as long as lateral lobes of lower lip.

40. *S. litwinowii* B. Fedtsch. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XIV (1951) 434.

Perennial. Plant 35–80 cm tall, covered throughout, except flowers, with brown, minute glandular hairs. Stem single, erect. Leaves broadly lanceolate, (4)6–8 cm long, (1.2)1.5–2.5 cm broad, gradually tapering above, acute, with sharply serrate margin, sessile or with 4–5 mm long petioles; floral leaves linear-subulate, 0.6–1 cm long, 0.5 mm broad. Inflorescence racemose, 15–25 cm long, 1–1.5 cm broad, narrow, interrupted. Bracts linear-subulate, 2.5–3 mm long, 0.3 mm broad, acute, equaling calyx or slightly longer. Flowers numerous, on 2–5 mm long pedicels, 2–3 in corymbs with 0.3–0.7 cm long peduncles (lower 1.5 cm long). Calyx subglabrous, 2.5 mm long; lobes oblong, obtuse, 1.5 mm long, 1 mm broad, with narrow white-scarious margin. Corolla 5–7 mm long, brownish red, glabrous, broader at base; lobes of upper lip oblong, orbicular above, narrowed at base, almost 2 times as long as lateral lobes of lower lip. Stamens included, filaments glandular-pubescent; staminode orbicular, 1 mm long. Ovary oblong, 1.5 mm long, 1 mm broad, glabrous; style filiform, 2 times as long as ovary. Capsule oblong, 5–8 mm long, 4–6 mm broad (in lower part), glabrous, acuminate. Seeds oblong-ellipsoid, 1.7 mm long, 0.7 mm broad, dark brown, straight or slightly curved. May to June.

In the middle and upper mountain zones at altitudes of 2000–3000 m in juniper thickets and near springs.—*Soviet Central Asia*: mountainous Turkmenia. Endemic. Described from Mt. Bozykyamov. Type in Leningrad.

41. *S. frigida* Boiss. Diagn. pl. or. I, VII, (1846) 42; Fl. or. IV, 411; Fedtsch. Rast. Turkest. 693.

Perennial. Plant 40–60 cm tall, glabrous, bluish green, with woody, more or less branched rootstock. Stem numerous, erect or slightly ascending, subcylindrical, virgate, projecting. Cauline leaves broadly lanceolate, 1.8–4.5 cm long, 0.5–1.5 cm broad, acute, incise-dentate, with a few large teeth along margin, subsessile or with 1.3 cm long petioles: floral leaves oblong-linear, 6 mm long, 0.5 mm broad, narrow, acute, entire or sometimes regularly dentate in lower part of inflorescence. Inflorescence paniculate, pyramidal, narrow, 20–27 cm long, 3 cm broad. Flowers on glandular-pubescent, 3.5 mm long pedicels; cymes 3–7-flowered with diffusely glandular, 0.5 cm long peduncles. Bracts lanceolate, scaly, 1.3–2 mm long, 0.3–0.4 mm broad, acute, glabrous. Calyx glabrous, 2 mm long; lobes orbicular, 1.5 mm long, 1.7 mm broad, with broad white-scarious margin. Corolla reddish or reddish brown, 4–5 mm long; lobes of upper lip orbicular, narrowed at base, 2–2.5 times as long as lateral lobes of lower lip. Stamens included, filaments glandular-hairy; staminode deltoid-orbicular, as long as broad. Ovary globose, 1.5 mm long and broad, glabrous; style 2 times as long as ovary. Capsule ovoid or globose, somewhat compressed, 4–4.5 mm long, 5 mm broad (in lower part), smooth, mucronate. Seeds ellipsoid, 1.3 mm long, 0.7 mm broad, dark brown. June.

In the lower and middle mountain zones, on rocky, stony slopes and in ravines.—*Soviet Central Asia*: mountainous Turkmenia, Pamiro-Alai. *General distribution*: Iran. Described from southern Iran, from mountains near Shiraz. Type in Geneva.

42. *S. integrifolia* Pavl. in Vestn. Akad. Nauk Kaz. SSR, No. 3 (60) (1950) 32.—*lc.*: Pavl. l.c. fig. 10.

Perennial. Plant with thick, almost woody, multiheaded rootstock. Stems numerous, ascending, 20–35 cm tall, slender, sulcate, dark green, glabrous or diffusely glandular-puberulent. Leaves obovate or ovate-lanceolate (middle cauline larger), 2.5–3 cm long, 1.5–2 cm broad, with 0.5–1 cm long petioles, and cuneate base, short-pointed or subobtusate, with irregularly incise-dentate margin or with the base incised into subobtusate, dentate lobes; both surfaces glabrous or diffusely glandular-puberulent along with petioles, pinnately veined. Flowers on erect, densely glandular-puberulent 3–7 mm long pedicels; cymes 1–3-flowered with 0.5–1 cm long glandular-hairy peduncles, forming paniculate, 9–12.5 cm long, 2–3.5 cm broad inflorescence. Bracts lanceolate, 2.5 mm long, 0.5 mm broad, acute. Calyx glabrous, 2.5–3 mm long; lobes broadly ovate or suborbicular, 1.5–2 mm long, 1.5–2.5 mm broad, with broad white-scarious margin. Corolla yellowish violet or yellowish brown, 5–6 mm long; lobes of upper



lip orbicular, narrowed at base, 2 times as long as lateral lobes of lower lip. Stamens exserted, filaments glandular-hairy; staminode obovate, obtuse or sinuate, slightly longer than broad. Ovary globose, 1 mm long, glabrous; style 3 times as long as ovary. Capsule globose, 4.5–5 mm long, glabrous, with 2 mm long beak. Seeds ovoid. June to July.

In mountains, crevices of rocks, on stony cliffs.—*Soviet Central Asia*: Tien Shan. Endemic. Described from southern Kazakhstan, above Aksar-Sai Ravine, near the village of Nanai. Type in Alma-Ata; isotype in Moscow.

Series 5. *Rutifoliae* Gorschk.—Staminode reniform, ovate, sometimes orbicular, entire or coarsely dentate, as long as, or  $2/3$  as long as broad. Lobes of upper corolla lip 2–5 times as long as lateral lobes of lower lip. Plants annual or biennial.

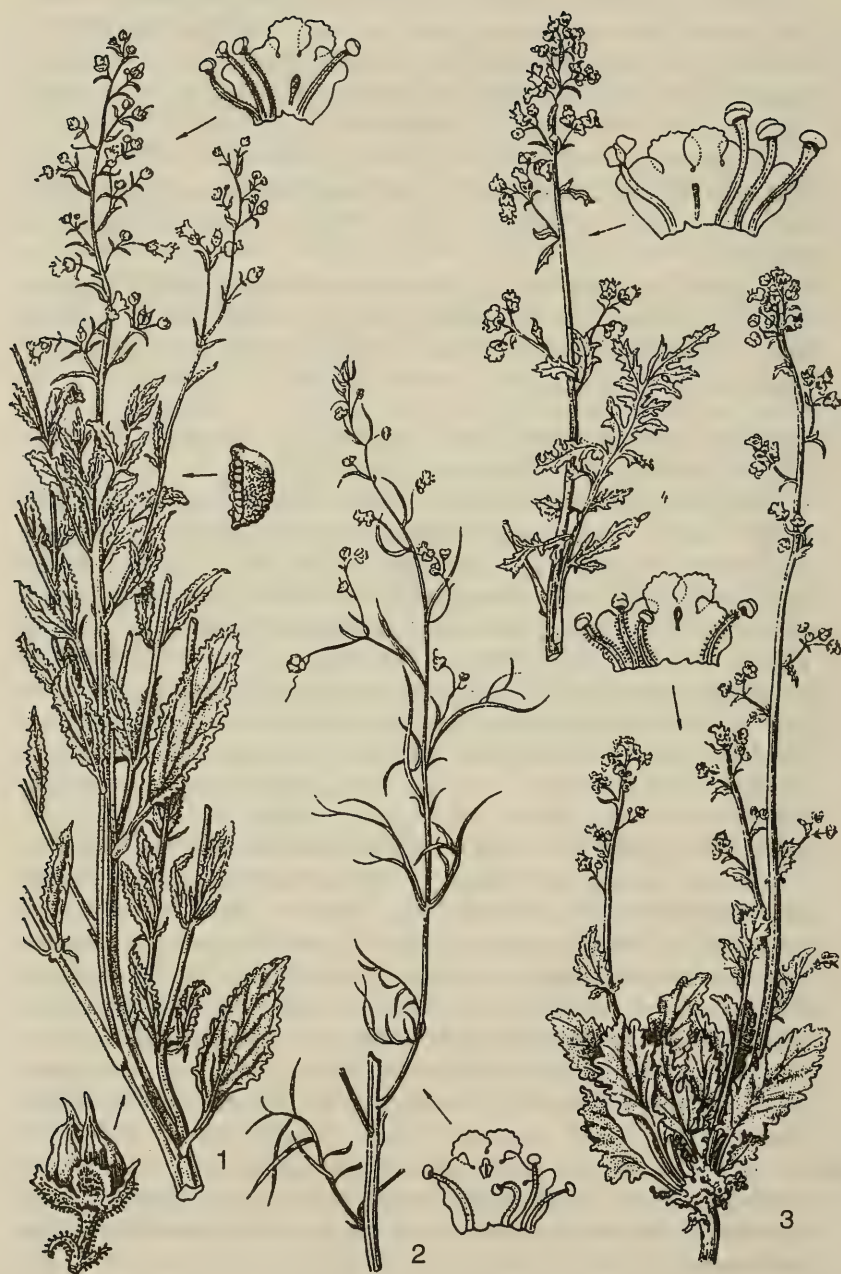
43. *S. rutifolia* Boiss. Fl. or. IV (1879) 404; Grossh. Fl. Kavk. III, 379.—*S. lucida* M. B. Fl. taur.-cauc. II (1808) 77, non L.

Biennial. Plant 40–60 cm tall, glabrous. Stems 4-angled, branched, reddish. Leaves pinnate or bipinnatisect, (1.5)4.5–6(8.5) cm long, (1)2.5–3(4) cm broad, with unequal, oblong, 0.7–1.7 cm long and 0.6–0.8 cm broad, shortly mucronate lobes or dentate segments, glabrous, with 2.5–3(4) cm long petioles; upper cauline leaves with 0.5–1 cm long petioles or sessile; floral leaves 5 mm long, 0.7 mm broad, narrowly lanceolate or linear, acute. Flowers numerous, on 0.5–1 mm long pedicels; cymes 5–10-flowered with rather thick, often forked 1–1.5 cm long peduncles, covered, along with pedicels, with brown glandular hairs, forming narrow, leafless, 15–35 cm long, 2–4.5 cm broad pyramidal inflorescence. Bracts linear, 2–3 mm long, slightly shorter than calyx, acute. Calyx glabrous, 2.5–3.5 mm long; lobes orbicular, 2–3 mm long, 2.5–2.7 mm broad, with whitish or brownish dentate margin. Corolla dark brownish red, 5–7.5 mm long; lobes of upper lip elongated, orbicular, 3–5 times as long as lateral lobes of lower lip. Stamens exserted, filaments glabrous; staminode reniform, somewhat sinuate above,  $2/3$  as long as broad. Ovary ovoid, 1.5 mm long, 1.2 mm broad, brown; style 2–3 times as long as ovary. Capsule compressed globose, 4 mm long and broad, smooth, with 1 mm long beak. Seeds dark brown, oblong, 1.2 mm long, 0.4 mm broad, somewhat curved. May to July.

286 In the middle mountain zone, on rocks.—*Caucasus*: Ciscaucasia, Dagestan, western, eastern and southern Transcaucasia, Talysh. *General distribution*: Armenia-Kurdistan. Described from outskirts of Tbilisi. Type in Geneva.

44. *S. olgae* Grossh. in Tr. Azerbaidzh. otd. Zakavkazsk. fil. Akad. Nauk SSSR, Sect. bot. I (1933) 55; Opred. rast. Kavk. 307.





Annual or biennial. Plant glabrous, 30–50 cm tall. Stems simple or sparingly branched. Leaves numerous, oblong-ovate or lanceolate, 2.5–8 cm long, 1.3–4(5) cm bipinnatisect, with elliptical, 2.5 mm long, 8 mm broad segments and numerous small, oblong, acute, 2–7 mm long, 1–2 mm broad lacinules; lower leaves with 3.5(6) cm long petioles, middle leaves with shorter, 1.5 cm long petioles; floral leaves from pinnatisect in lower part of inflorescence to oblong and linear, 0.5–1(1.8) cm long, 0.6–4(9) mm broad, acute. Flowers numerous, on brown glandular-pubescent 1–3 mm long pedicels; cymes 4–6-flowered with 0.5–1.7 cm long peduncles covered with brown glandular hairs, forming pyramidal paniculate, interrupted, 7–19 cm long, 2–4 cm broad sparse inflorescence. Bracts lanceolate, 2.5 mm long, acute, diffusely glandular. Calyx 2.8(3) mm long, glabrous or sometimes brown glandular-hairy at base, lobes ovate, 2 mm long, 1.8 mm broad, with broad brown-scarious dentate margin. Corolla dark purple, 5.5 mm long; upper lip brighter in color lobes orbicular, narrowed at base, 2–2.5 times as long as lateral lobes of lower lip. Stamens exserted, filaments glandular-pubescent; staminode orbicular-reniform, slightly broader than long. Ovary ovoid, 0.8 mm long, 0.6–0.8 mm broad, glabrous, yellowish brown; style 5 times as long as ovary. Capsule broadly ovoid, 4.5 mm long, 4–4.5 mm broad, glabrous, with 2 mm long beak, light brown. Seeds almost trigonous, 1.2 mm long, 0.7 mm broad, dark brown. July.

On offshore shingle.—*Caucasus*: southern Transcaucasia. Endemic. Described from Sevan Lake. Type in Baku.

45. *S. armeniaca* Bordz. in Sb. pam. A.V. Fomina (1938) 63.—*lc.*: Pl. or. exs. No. 168, sub *S. rutaefolia* Grossh.

Perennial. Plant 18–40 cm tall. Stems 4-angled, simple or rarely branched, sometimes reddish or dark blood-red in lower part, with dotted bloom, covered with brown glandular hairs in upper part. Leaves oblong-ovate or oblong, 3.2–5.5 cm long, 1.3 cm broad, bi- or tripinnatisect; segments elongated ovate, 3–8 mm long, 0.5–1.5 mm broad, terminal segment 5 mm long, 3 mm broad, linear-lanceolate, entire or sparsely dentate, decurrent at base; lower leaves with 2.5–5.5 cm long petioles, upper with 0.5–1 mm long petioles or subsessile; all leaves glabrous; lower floral leaves pinnatisect, 5 mm long, 3 mm broad, with linear

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Plate XIII.

1. *Scrophularia canescens* Bong., upper portion of plant, capsule, section of corolla, seed. —2. *S. thesioides* Boiss. and Buhse, upper portion of plant, section of corolla. —3. *S. pruinosa* Boiss., general appearance of plant, section of corolla. —4. *S. dissecta* (B. Fedtsch.) Gorschk., upper portion of plant, section of corolla.

- 287 segments, upper entire, linear, 5 mm long, 0.5 mm broad, acute. Flowers numerous; pedicels 1–4.5 mm long glandular-pubescent along with peduncles, peduncles 0.5–1.7 cm long; cymes forked, 3–7(8)-flowered forming oblong-pyramidal, paniculate 5–20(27) cm long, 3–4.5 cm broad sparse inflorescence. Bracts linear-subulate, 2–3 mm long, 0.5 mm broad, glandular-pubescent. Calyx 2.5–3 mm long, glabrous; lobes orbicular, 2 mm long and broad, with dentate-scarious margin. Corolla dark blood-red, 6–7 mm long; lobes of upper lip orbicular, brighter in color, narrowed at base, 2 times as long as lateral lobes of lower lip. Stamens exserted, filaments glandular-pubescent; staminode ovate or sometimes orbicular, entire or obscurely coarsely dentate, almost as long as broad. Ovary globose, 1.5 mm long and broad, glabrous; style 2–2.5 times as long as ovary. Capsule compressed globose, 4 mm long and broad, acuminate, glabrous. Seeds not known.

*Caucasus*: Southern Transcaucasia. Endemic? Described from Armenia, Yelenovka, Mt. Bugda-Tapa. Type in Kiev.

Series 6. *Rostratae* Gorschk.—Staminode reniform, half as long as broad. Lobes of upper corolla lip almost equaling lateral lobes of lower lip. Capsule 2–3 times as long as calyx, with a beak slightly shorter than the capsule.

46. *S. rostrata* Boiss. and Buhse in Nouv. Mém. Soc. Nat. Mosc. XII (1860) 163; Boiss. Fl. or. IV, 412; Grossh. Fl. Kavk. III, 378.

- Perennial. Plant 40–60 cm tall, glabrous. Stems numerous, obtusely 4-angled, simple. Radical leaves with 2–4.5 cm long petioles, lyrate, 7–8 cm long, 3–4.5 cm broad; lateral segments 2–4, 2 cm long, 1 cm broad, oblong, acute; terminal segment larger, 2.5–3(5) cm long, 1.5–2(3) cm broad, ovate, obtuse, incise-dentate or lobed, lobes orbicular, dentate; cauline leaves sharply reduced upward, 2–4(6) cm long, 1.2(3) cm broad, interrupted-pinnate or dissected, with oblong-lanceolate, 0.5–1.5 cm long, 2–5 mm broad, dentate, acute lobes; floral leaves similar to cauline leaves, 1.5 cm long, 0.4 cm broad, linear or filiform in upper part of inflorescence, 0.5–1 cm long, 0.3–1 mm broad, acute. Flowers numerous, on 1(2) mm long glandular-pubescent pedicels; cymes 1–3-flowered with 1–3 cm long peduncles covered with brown glandular hairs, forming sparse, pyramidal, paniculate, up to 25 cm long, 4–7 cm broad leafless inflorescence. Bracts linear, 3–4 mm long, 0.3–0.5 mm broad, acute, glabrous. Calyx 2.5–3 mm long, glabrous; lobes ovate, 1.5–2 mm long, 1.5 mm broad, with narrow white-scarious margin. Corolla brownish green or dull brown, 5–6 mm long; lobes of upper lip orbicular, almost equaling lateral lobes of lower lip. Stamens exserted, filaments glandular-pubescent; staminode reniform, entire, half as long as broad. Ovary globose, 1.5 mm long, glabrous; style 3 times as long as ovary or longer. Capsule globose-ovoid, 6(8) mm long,
- 288



7 mm broad, glabrous, reticulate, with 4(6) mm long beak. Seeds oblong-ellipsoid, 1.5 mm long, 0.7 mm broad, dark brown. May to June.

Dry slopes in river valleys, on shingle.—*Caucasus*: Talysh. *General distribution*: Iran (north). Described from Gilyan Province. Isotype in Leningrad.

Series 7. *Olympicae* Gorschk.—Staminode reniform or orbicular, as long as broad or slightly longer, entire or coarsely crenate-dentate. Lobes of upper corolla lip 2 times as long as lateral lobes of lower lip. Perennials.

47. *S. ruprechtii* Boiss. Fl. or. IV (1879) 410; Stiefelbag. l.c. 470; Grossh. Fl. Kavk. III, 380.

Perennial. Plant (6)8–20 cm tall, glabrous. Stems numerous, ascending, simple. Leaves oblong, 2.5–3.5 cm long, 1.2–2.2 cm broad, lyrate-pinnatifid or dissected into oblong, unequally incise-dentate, 0.4–1 cm long, 0.2–0.4 cm broad segments, petioles 0.6–2 cm long; floral leaves lanceolate, pinnatisect, 1–1.5 cm long, 3–6 mm broad, acute. Flowers on short glandular-pubescent, 3–6 mm long pedicels, forming terminal, simple, oblong, dense, 2–5.5 cm long, 1.5–2 cm broad almost spicate inflorescence. Bracts linear, 5–8 mm long, 0.5 mm broad. Calyx 3–3.5 mm long, glabrous; lobes orbicular, obtuse, with broad purple margin, 2 mm long, 2.5 mm broad. Corolla pale yellow, 5–7 mm long; upper lip dull purple, lobes orbicular, narrowed at base, almost 2 times as long as lateral lobes of lower lip. Stamens included, filaments glandular-pubescent; staminode reniform, as long as broad or slightly longer, with cordate base. Ovary ovoid, 1.5 mm long, 1.2 mm broad, yellowish brown; style 2.5 times as long as ovary. Capsule ovoid, 4–4.5 mm long and broad, acuminate, smooth, with 2 mm long beak. Seeds 1 mm long, 0.3 mm broad, ellipsoid, dark brown. June to July (Plate XII, fig. 1).

In alpine zone, on debris, moraines and subalpine meadows.—*Caucasus*: Ciscaucasia, Dagestan, eastern Transcaucasia. Endemic. Described from Alagir. Isotype in Leningrad.

48. *S. olympica* Boiss. Diagn. pl. or. I, IV (1844) 69; Benth. in DC. Prodr. X, 312; Grossh. Fl. Kavk. III, 379; Bordzil. in Sb. pam. A.V. Fomina, 62.—*S. pyrrollopha* Boiss. Fl. or. IV (1879) 409.—*S. caucasica* Somm. and Lev. in Nouv. Giorn. Bot. Ital. ser. II, vol. 4 (1897) 204.—*S. platyloma* Fisch. and Mey. in herb.—*l.c.*: Somm. and Lev. in Tr. Bot. sada, XVI, Plate XXXVII.—*Exs.*: GRF, No. 473.

Perennial. Plant (10)30–50 cm or 40–60 cm (var. *platyloma* (F. and M.) Grossh.) tall, glabrous. Stems numerous, 4-angled, simple, mostly reddish black. Leaves with 0.5–7 cm long petioles, yellowish green, oblong, 1.5–5.5 cm long, 1–4 cm broad or oblong-ovate, 8.5 cm long, 4.5 cm broad (var. *platyloma* (F. and M.) Grossh.), pinnatifid, lyrate-dissected,



incise-dentate or deeply dissected (var. *pinnatifida* Trautv. in herb.) with oblong, acute, 1–8 mm long, 1–4 mm broad, generally dentate-incised lobes or all leaves entire; lower leaves rhombic-ovate, doubly dentate; upper leaves ovate-lanceolate (var. *integrifolia* Bordz.); floral leaves linear, 4.5 mm long, 0.5–1 mm broad or in the lower part of inflorescence ovate-lanceolate, 0.7–1 cm long, 2–4 mm broad, dentate. Flowers on 2 mm long, brown glandular-puberulent pedicels; cymes 1–3-flowered with glandular-pubescent 5 mm long peduncles forming pyramidal 2.5–10 cm long, 1–2 cm broad inflorescence. Bracts linear, 3.4 mm long, 0.6 mm broad, subacute. Calyx glabrous, 3–3.5 mm long; lobes orbicular, 1.8–2 mm long, 2–2.3 mm broad, with brown, purple or generally broadly scarious margin, undulate-crispate. Corolla yellowish, 4.5–5 mm long; upper lip purple, lobes orbicular, narrowed at base, 2 times as long as lateral lobes of lower lip. Stamens included, filaments glabrous; staminode reniform, broadly cordate at base, slightly longer than broad. Ovary ovoid, 2 mm long, 2.5 mm broad; style 2 times as long as ovary. Capsule globose, 5 mm long, 4 mm broad, glabrous, acuminate. Seeds ellipsoid, 0.7–1 mm long, 0.3–0.4 mm broad, dark brown. May to July.

In mountains, at altitudes up to 1300–3250 m, in meadows, on debris and in moraines.—*European USSR*: Crimea (Baidary); Caucasus: Ciscaucasia, Dagestan, western, eastern and southern Transcaucasia. *General distribution*: Balkan States-Asia Minor, Armenia-Kurdistan. Described from Mt. Olympus. Type in Leningrad.

49. *S. exilis* Popl. in Spisok rast. sobr. v Krymsk. Gos. zapov. (1931) 85.

Perennial. Plant 10–15 cm tall, glabrous. Root slender, straight. Stems numerous, 4-angled, dark red, simple, forming small tufts. Leaves dark green, oblong-elliptical; lower leaves 1–3(5) cm long, 0.6–1.5 cm broad, with 1.3–2 cm long petioles, entire, incised or pinnatisect like upper leaves; upper leaves 1–2 cm long, 1 cm broad, sessile, all with oblong-obovate 1 cm long, 0.3 cm broad, obtuse, lobes, sometimes finely incised; floral leaves linear, 3 mm long, 0.2 mm broad, or those in the lower part of inflorescence lanceolate, 0.8–1 cm long, 1–2 mm broad, dentate or pinnatisect, 1.5 cm long, 0.6 cm broad. Flowers on 2–5 mm long pedicels, glandular-pubescent like peduncles; cymes 1–3-flowered with 0.6–1.2 cm long peduncles, forming sparse, 5 cm long, 1.5–3 cm broad paniculate inflorescence. Bracts linear, 2 mm long, 0.2 mm broad, acute. Calyx 3 mm long, glabrous; lobes elliptical, 2.5 mm long, 1.8 mm broad, with broad white-scarious margin. Corolla dark red, 6 mm long; lobes of upper lip orbicular, narrowed at base, 2 times as long as lateral lobes of lower lip. Stamens exserted; staminode orbicular, narrowed at base, as long as broad, sometimes obscurely and coarsely crenate-dentate. Ovary globose, 1.5 cm

long and broad, glabrous; style 3–3.5 times as long as ovary. Capsule globose, 6–7 mm long, 5–7 mm broad, smooth, apiculate. Seeds ellipsoid, 2 mm long, 1 mm broad. June.

Stony debris.—*European USSR*: Crimea. Endemic. Described from a national park near Gurzuf Saddle. Type in Leningrad.

Series 8. *Xanthoglossae* Gorschk.—Staminode semiorbicular or orbicular, as long as broad or slightly shorter, entire or obscurely dentate. Lobes of upper corolla lip 2–4 times as long as lateral lobes of lower lip.

50. *S. grossheimii* B. Schischk. in Beih. zum Bot. Centralbl. XLIV, 2 (1927) 238; Grossh. Fl. Kavk. III, 379. —*S. pruinosa* auct. non Boiss.: Grossh. in Tr. Tifl. bot. sada, II, I (1920) 25.—*Exs.*: Pl. or. exs. No. 272.

Perennial. Plant 25–60 cm tall, grayish green, covered with numerous minute glandular, brown and white erect hairs, except flowers. Stems numerous, spreading, projecting, dark purple in lower part. Leaves elliptic-lanceolate, 2–3 cm long, 1–1.5 cm broad, pinnatisect; segments linear-oblong, acute, regularly spaced and irregularly sharply dentate, 1.5–2 cm long, 0.4–0.6 cm broad; petioles 0.5–2 cm long; floral leaves 1.5–2 cm long, 1.5 cm broad, upper linear, 5 mm long, 0.5 mm broad, sessile. Flowers numerous, on 1–4 mm long pedicels; cymes 2–3-flowered, regularly spaced with 0.5–2 cm long peduncles, forming oblong, leafless, 9–23 cm long, 2–4 cm broad lax inflorescence. Bracts linear, almost setose, acute, 0.7–1.3(2) mm long, diffusely glandular. Calyx 1.8 mm long, glabrous; lobes elliptical, with broad white-scarious margin, obtuse, 1.5 mm long, 1 mm broad. Corolla brownish red, 4–4.5 mm long; lobes of upper lip orbicular, narrowed at base, 2 times as long as lateral lobes of lower lip. Stamens exserted, filaments diffusely glandular; staminode semiorbicular, as long as broad. Ovary globose, 0.7 mm long and broad, glabrous; style 291 5–6 times as long as ovary. Capsule globose, 3.5–4 mm long and broad, glabrous, beak short. Seeds oblong, 1 mm long, 0.5 mm broad, dark brown, almost black, generally curved. May to June.

Stony slopes and coastal sands.—*Caucasus*: eastern and southern Transcaucasia, Talysh. *General distribution*: Iran (north). Described from Talysh. Type in Tbilisi.

51. *S. xanthoglossa* Boiss. Diagn. pl. or. I, 12 (1853) 38; Boiss. Fl. or. 413; O. and B. Fedtsch. Perech. rast. Turkest. 5, 86; Fedtsch. Rast. Turkest. 692.

Perennial. Plant woody at base, 40–60(80) cm tall, glabrous, bluish green. Stems numerous, erect or slightly ascending, branched; lower leaves obovate-cuneate, 1–1.8 cm long, 0.9 cm broad, obtuse, flabellate, dentate or incised, with 0.5–2 cm long petioles; other leaves pinnate, 4 cm long, 2 cm broad, with 2 cm long petioles, lobes dentate, lower 0.8–1 cm

long, 2 mm broad, oblong, obtuse, upper lobes narrowly lanceolate or linear, 1.5 cm long, 2.3 mm broad, acute; floral leaves linear, acute, 0.5–1.7 cm long, 0.7–1.3 mm broad. Flowers numerous, regularly spaced, sessile or on 7 mm long glandular-pubescent pedicels; cymes 1–3-flowered with branched glandular-puberulent peduncles forming up to 35 cm long, 3.6(7) cm broad paniculate branched inflorescence. Bracts linear, almost subulate, 3.5 mm long, lower with lateral teeth, glabrous. Calyx 2 mm long, glabrous or sometimes glandular-hairy at base; lobes ovate, 1.8 mm long and broad, with broad dentate white-scarious margin. Corolla 5.5 mm long, brownish red or dark purple; lobes of upper lip dark red, orbicular, narrowed at base, 3 times as long as lateral lobes of lower lip. Stamens exserted, filaments diffusely glandular-pubescent; staminode large, orbicular, narrowed at base,  $\frac{2}{3}$  as long as broad, yellowish, obscurely denticulate along margin. Ovary ovoid, 1.2 mm long, 1.5 mm broad; style 4–5 times as long as ovary. Capsule globose, glabrous, 3–3.5 mm long and broad, short-mucronate. Seeds oblong-ellipsoid, 1 mm long, 0.7 mm broad, dark brown. April to May (Plate XII, fig. 3).

Foothills, steppe, stony and clayey-stony slopes.—*Soviet Central Asia*: Balkhash Region, mountainous Turkmenia, Syr Darya, Pamiro-Alai, Tien Shan. *General distribution*: eastern Mediterranean Region, Balkan States-Asia Minor, Iran. Described from Jerusalem. Type in Geneva.

52. *S. striata* Boiss. Fl. or. IV (1879) 413; 473.—*S. juncea* Richt. ex Stapf in Denkschr. Akad. Wien, I (1885) 24; O. and B. Fedtsch. Perech. rast. Turkest. 5, 85; Fedtsch. Rast. Turkest. 693.

292 Perennial. Plant glabrous, 25–30 cm tall, multicaulis. Stems slender, striated, virgate. Leaves pinnatipartite, 3–4(5) cm long, 1 cm broad, with 0.5–1(2) cm long slender petioles, lateral lobes small, shortly triangular-lanceolate, 0.5–1.5 mm long, 1 mm broad, decurrent, terminal lobe tripartite, 1.2 cm long, 2–3 mm broad; upper leaves linear, 1 cm long, 1.5 mm broad, sessile. Flowers numerous, sessile or on 2–3 mm long pedicels, 2–5(9) in sparse corymbs with 0.5–1 cm long peduncles forming 14 cm long, 1.5 cm broad narrow paniculate branched inflorescence, leafy in lower part. Calyx glabrous, 1.7 mm long; lobes ovate, 1.3 mm long, 0.7 mm broad, with broad white-scarious margin. Corolla reddish brown, 3.5 mm long; lobes of upper lip red, orbicular, narrowed at base, 2 times as long as lateral lobes of lower lip. Stamens exserted, filaments glandular; staminode orbicular, 1.2 mm long, 1.5 mm broad, equaling upper corolla lobes, narrowed at base. Ovary globose, 1 mm long and broad, smooth; style 4 times as long as ovary. Capsule globose, 3.5 mm long and broad, glabrous, with a small acute beak. April to May.



In mountain ravines and limestones slopes.—*Soviet Central Asia*: mountainous Turkmenia, Pamiro-Alai. *General distribution*: Iran. Described from the region of Jezd city. Type in Geneva.

53. *S. decipiens* Boiss. and Kotschy Diagn. pl. or. II, 3 (1856) 156; Grossh. Fl. Kavk. III, 380.—*S. xanthoglossa* Boiss. var. *decipiens* (Boiss. and Kotschy) Boiss. Fl. or. IV (1879) 413.

Perennial. Plant 30–60 cm tall, glabrous, bluish or yellowish green. Stems 4-angled, divaricately branched, generally purplish brown in lower part. Lower leaves obovate-cuneate, 1.5–4 cm long, 1–1.8 cm broad, crenate-dentate, with 0.7–2 cm long petioles; other leaves pinnatisect or bipinnatisect, (1)3–6 cm long, (0.7)1.2–2.5 cm broad, lobes narrowly lanceolate or linear, dentate, acute, 7 mm long, 3 mm broad; leaves subsessile or with short (lower ones), 0.7–1 cm long petioles; floral leaves lanceolate, 3.5 mm long, 0.3–0.5 mm broad, acute; all leaves glabrous. Flowers numerous, on glabrous or glandular-pubescent, 5 mm long pedicels; cymes divaricate 2–3-flowered, with smooth, rather thick axillary 0.5–1 cm long peduncles, forming lax, 8–21(50) cm long, 2–4.5(11) cm broad paniculate inflorescence. Bracts lanceolate, acute, 2 mm long, glabrous. Calyx smooth, 2 mm long; lobes oblong, 1.8 mm long, 1.7 mm broad, with broad white-scarious margin. Corolla purplish brown, 4–5.5 mm long, 3 mm broad; lobes of upper lip orbicular, narrowed at base, 3–4 times as long as lateral lobes of lower lip, white-margined in upper part. Stamens included, filaments glandular-pubescent; staminode equaling or sometimes exceeding lobes of upper corolla lip, orbicular, narrowed at base, yellowish, somewhat obscurely dentate along margin. Ovary 0.7 mm long and  
293 broad, ovoid-globose, glabrous; style 5 times as long as ovary. Capsule 3 mm long and broad, ovoid-globose, smooth, apiculate. Seeds 1 mm long, 0.7 mm broad, ellipsoid, dark brown. May to June.

In lower and middle mountain zones, on stony slopes and debris.—*Caucasus*: Southern Transcaucasia, Talysh. *General distribution*: Balkan States-Asia Minor. Described from Taurus Mts. Type in Geneva.

Series 9. *Schugnanicae* Gorschk.—Staminode obtusely 3–5-angled, elliptical or reniform, almost as long as or 1/3 as long as broad, mostly coarsely crenate-dentate. Lobes of upper corolla lip 2–3 times as long as lateral lobes of lower lip.

54. *S. fedtschenkoi* Gorschk. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XIV (1951) 446.—*S. schugnanica* B. Fedtsch. nomen in herb.

Perennial. Plant glabrous. Stems numerous, up to 50 cm tall, often reddish at base, erect. Leaves elliptical or oblong-ovate, 2.5–3 cm long, 0.5–0.7 cm broad, acute, incised into lanceolate or linear, 1–4.5 mm long, 0.7–1.5 mm broad, acute, lobes; lower leaves longer, lobes sometimes



denticulate, directed obliquely upwards, petioles 0.5–0.7 cm long; lower floral leaves similar to cauline leaves but smaller, upper generally linear, 4 mm long, 0.5 mm broad, acute. Inflorescence oblong, paniculate, few-flowered, 7–25 cm long, 2–3 cm broad. Bracts linear, subobtusate, equaling or slightly exceeding calyx, sometimes sparsely glandular-puberulent along margin; cymes 1–2-flowered with 0.5–1 cm long peduncles covered with scattered, brown glandular hairs along with 1.7 mm long pedicels. Calyx glabrous, 2 mm long; lobes orbicular, 1.8 mm long, with broad scarious margin. Corolla reddish, 4.8–5 mm long, 3 mm broad, glabrous; lobes of upper lip orbicular, slightly narrowed at base, 2–3 times as long as lateral lobes of lower lip. Stamens included, filaments diffusely glandular-pubescent; staminode triangular, 0.8 mm long, 0.6 mm broad, narrowed at base, coarsely crenate above. Ovary globose, 1 mm long, glabrous, dark brown; style 4 times as long as ovary. Capsule globose, 5 mm long, smooth, brown, acuminate. Seeds oblong, 1 mm long, 0.5 mm broad, dark brown, almost black. July.

In mountains.—*Soviet Central Asia*: Pamiro-Alai (Gorno-Badakshan Autonomous Region). Endemic. Described from Shatkharfa Pass. Type in Leningrad.

55. *S. zaravschanica* Gorsch. and Zakir. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XIV (1951) 448.

- 294 Perennial. Plant glabrous, up to 65 cm tall. Stems erect, brown or reddish at base. Leaves oblong-elliptical, 2.5–6.5 cm long, 1.2–4.5 cm broad or short-lobed with lower lobes lanceolate, 1.8 cm long, 0.7 cm broad and upper lobes 1 cm long, 0.6 cm broad, acute, with coarsely unequally dentate margin; leaves smooth, with cuneate base, and 0.5–1(1.5) cm long petioles; floral leaves lanceolate, 2.5 mm long, 0.5 mm broad, acute, dentate. Flowers numerous, on 3–5 mm long pedicels, covered, along with peduncles, with minute brown glandular scattered hairs; flowers singly or in 2–3-flowered cymes with axillary 1–2.8 cm long peduncles, forming 22–35 cm long, 3–6 cm broad sparse paniculate inflorescence. Bracts 1.5 mm long, lanceolate, subacute, glabrous, sparsely glandular-hairy along margin. Calyx 1.8–2 mm long, glabrous; lobes orbicular, 1.5 mm long, with broad scarious and obscurely dentate margin. Corolla reddish, 4.5–5 mm long, 3 mm broad, glabrous; lobes of upper lip orbicular, narrowed at base, 3 times as long as lateral lobes of lower lip. Stamens exerted, filaments diffusely glandular-pubescent; staminode reniform, obscurely tridentate above, 3 times as broad as long. Ovary globose, 1.5 mm long and broad, yellowish brown, glabrous; style 2.5 times as long as ovary. Capsule globose, 5 mm long and broad, glabrous, with short beak. Seeds oblong, 1–1.3 mm long, 0.4–0.5 mm broad, dark brown. August.

Along freshwater canals.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from Zeravshan Glacier, Farakhnau. Type in Tashkent.

56. *S. pamiro-alaiica* Gorschk. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XV (1953) 369.

Perennial. Plant up to 65 cm tall, glabrous. Stems numerous, erect, 4-angled. Leaves ovate or oblong-ovate, 4–5 cm long, 2.3–4.5 cm broad, lobed or almost incised; lobed oblong, 1–2.5 cm long, 0.4–0.8 cm broad; terminal lobe 2.5 cm long, 1 cm broad; all denticulate, acute; floral leaves 3 cm long, 1–2 cm broad, less dissected; all leaves with cuneate base, and 0.5–1.5 cm long petiole. Inflorescence paniculate, sparse, 20–25 cm long, 2–3(4) cm broad. Bracts lanceolate, 2 mm long, 0.5 mm broad, acute. Flowers numerous, generally singly on 1–1.7 cm long brown glandular-hairy pedicels; sometimes in 3-flowered cymes with glandular-pubescent 1–1.5(2) cm long peduncles. Calyx 4 mm long, glabrous; lobes orbicular, 2.5 mm long, with broad scarious margin. Corolla 6 mm long, yellowish brown; lobes of upper lip sometimes reddish, orbicular, narrowed at base, 1.5–2 times as long as lateral lobes of lower lip. Stamens included, 295 filaments diffusely glandular-pubescent; staminode orbicular, almost 5-angled, as long as broad. Ovary globose, 1.5 mm long, glabrous; style 2 times as long as ovary. Capsule and seeds not known. August.

In the lower belt of brushwood zone.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from the valley of the Nau-Khakimi River, near the village of Kanyaz-Poyen. Type in Leningrad.

57. *S. gontscharovii* Gorschk. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XV (1953) 370.

Perennial. Plant 35–45 cm tall, glabrous. Rootstock 1–1.3 cm in diameter. Stems numerous, 4-angled. Leaves ovate or oblong-ovate, 2–3 cm long, 2 cm broad, incised; lobes oblong, 0.5–1 cm long, 0.3–0.4 cm broad; terminal lobe 1.2–1.5 cm long, 0.5–0.6 cm broad; all lobes acute, with regularly denticulate margin; leaves cuneate at base, with 0.5–1.5 cm long petioles; floral leaves 3.5 mm long, 1 mm broad, entire, lanceolate, acute. Inflorescence paniculate, 13–20 cm long, 1.5 cm broad. Bracts 1.5–2 mm long, 1 mm broad, acute. Flowers numerous, on 3–6 mm long pedicels, covered, with scattered brown glandular hairs along with peduncles; cymes 1–2-flowered with 7 mm long peduncles. Calyx 2.5–3 mm long, glabrous or sometimes glandular-pubescent in lower part; lobes orbicular, 2 mm long, with broad white-scarious margin. Corolla brown, 4.5–5 mm long; lobes of upper lip reddish violet, orbicular, narrowed at base, 2 times as long as lateral flat lobes of lower lip. Stamens included, filaments glabrous; staminode elliptical, 1 mm long, 0.8 mm broad or almost 4-angled, narrowed at base, sometimes coarsely crenate above. Ovary globose, 1.5 mm

long; style 4–5 times as long as ovary. Capsule and seeds not known. September.

In subalpine belt at 2700 m—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from upper reaches of Tupalang River, below the pass on Azor-Chashme River. Type in Leningrad.

Series 10. *Multicaules* Gorschk.—Staminode obovate-spatulate, slightly longer than broad. Lobes of upper corolla lip dark violet, almost black, 2 times as long as lateral lobes of lower lip.

58. *S. multicaulis* Turcz. in Bull. Soc. Nat. Mosc. 14 (1840) 76; Benth. in DC. Prodr. X, 313; Ldb. Fl. Ross. III, 220.—*S. stelleri* Ldb. in Denkschr. Bot. Ges. Regensb. III (1841) 98.

Perennial. Plant 20–45 cm tall. Stems numerous (10–20), branched from base, upper part as well as peduncles and pedicels, sparsely covered with brown glandular-hairs. Leaves pinnatisect, 4 cm long, 1 cm broad, with 0.5–1.5 cm long petioles, segments incised pinnatifid, with  
 296 linear-lanceolate, 1 cm long, 1.5 mm broad, acute lobes; floral leaves linear, sometimes pinnately lobed, 0.5–2.5 cm long, 1–1.5 mm broad, acute. Flowers numerous, on 0.5–1 cm long pedicels 3–4 times as long as calyx; cymes 1–3-flowered with axillary, 0.5–1 cm long peduncles, forming 8–15 cm long, (1)2–2.5 cm broad oblong, pyramidal inflorescence. Bracts narrow-linear, almost filiform, 1.5–4 mm long, 0.3–0.5 mm broad. Calyx glabrous, 2.5–3 mm long; lobes broad-elliptical, 1.5–2.5 mm long, 1 mm broad, with narrow scarious margin. Corolla 5.5–6 mm long, brown, tube and lower lip dark violet; lobes of upper lip dark violet, almost black, 2 times as long as lateral lobes of lower lip. Stamens included, filaments glandular, with black anthers; staminode obovate-spatulate, slightly longer than broad. Ovary ovoid, 1 mm long and broad, glabrous; style 3 times as long as ovary. Capsule ovoid-globose, 5 mm long, 6 mm broad, glabrous, brown. Seeds dark brown, ellipsoid, 0.7 mm long, 0.3 mm broad. May to June (Plate XII, fig. 4).

Clayey slopes, rubbly areas with steppe vegetation and stony outcrops.—*Eastern Siberia*: Angara-Sayan. Endemic. Described from outskirts of Krasnoyarsk. Type in Leningrad.

Series 11. *Haematanthae* Gorschk.—Staminode oblong, slightly sinuate or bilobed. Plants biennial. This series also includes *S. heldreichii* Boiss. from Asia Minor.

59. *S. haematantha* Boiss. and Heldr. in Boiss. Fl. or. IV (1879) 415; Bordzil. in Sb. pam. A.V. Fomina, 63; Grossh. Opred. rast. Kavk. 309.

Biennial. Plant glabrous. Stems cylindrical, branched, projecting. Leaves oblong, with cuneate base, acute, dentate, lower leaves with long petioles, upper sessile. Pedicels glandular-pubescent, 2 times as long as



calyx; cymes 3–7-flowered; forked, divaricate, forming paniculate sparse inflorescence. Bracts short-subulate. Calyx glabrous, lobes ovate, with broad scarious margin. Corolla blood-red; lobes of upper lip broad, orbicular. Stamens included; staminode oblong. Capsule globose, long tapering, 1.5 times as long as calyx.

*Caucasus*: Southern Transcaucasia (outskirts of city of Ordubad). Type of the variety in Kiev. Described from Iran.

*Note*. In our flora, only the var. *crenata* Bordz. l.c. has been reported.—Leaves ovate, 4.2 cm long, 2.8 cm broad, doubly crenate, with 2 cm long petioles. Calyx lobes elongated obovate, 2–2.5 mm long. Corolla 5–6 mm long. Stamens exserted; staminode oblong, slightly sinuate above or bilobed, lobes almost angular, acute, divergent.

297 *Note*. In the absence of type material or var. *crenata* Bordz. in the herbarium of the Botanical Institute, Akad. Nauk SSSR, the assumption of A.A. Grossheim that this plant from Ordubad is related to *S. atropatana* seems doubtful.

Series 12. *Leucocladae* Gorschk.—Staminode lanceolate, acuminate, more than 3 times as long as broad. Lobes of upper corolla lip slightly longer than lateral lobes of lower lip. Semishrub; bark covered with a white bloom.

60. *S. leucoclada* Bge. in Mém. sav. etr. Pétersb. VII (1851) 424; Boiss. Fl. or. IV, 421; O. and B. Fedtsch. Perech. rast. Turkest. 5, 89; Fedtsch. Rast. Turkest. 654.

Biennial. 25–40 cm tall, semishrub, glabrous. Root woody, thick, more or less branched. Stems simple or branched, virgate; year-old branched greenish violet, without bloom. Leaves oblong, 2–3.8 cm long, 3–5 mm broad, narrowed at base, subsessile, entire, subacute; floral leaves oblong or linear, 3 mm long, 0.5 mm broad, subacute. Flowers on 0.3–0.7 mm long pedicels; cymes 1–3-flowered with axillary 2–2.5 mm long peduncles, forming elongate paniculate, 11–44 cm long, 1–3 cm broad, narrow inflorescence. Bracts oblong, 0.7 mm long, 0.3–0.5 mm broad, subacute. Calyx glabrous, 1.8–2.3 mm long, lobes orbicular-ovate, 1.5–2 mm long and broad, with broad, white-scarious margin. Corolla brownish red, 4–5 mm long; upper lip bright red, lobes orbicular, narrowed at base, slightly longer than lateral lobes of lower lip. Stamens exserted, filaments diffusely glandular-pubescent; staminode lanceolate, acuminate, 2.5 times as long as broad. Ovary globose, 1 mm long, 1.3 mm broad, yellowish brown, glabrous; style 5 times as long as ovary. Capsule globose, 3–3.5 mm long, acuminate, smooth. Seeds oblong-ellipsoid, 2 mm long, 1.2 mm broad, dark brown, somewhat flat, slightly curved. May.

Sandy river beds, salt marshes along banks of lakes, sand edges, pebbly slopes.—*Soviet Central Asia*: Kyzyl Kum, Amu Darya, Pamiro-Alai,



Tien Shan. Endemic. Described from Kyzyl Kum Desert, Bakaly. Type in Leningrad.

Series 13. *Cretaceae* Gorschik.—Staminode oblong, sometimes oblong-triangular, 3 times as long as broad. Lobes of upper corolla lip 1.5 times as long as lateral lobes of lower lip.

61. *S. cretacea* Fisch. Hort. Gorenk. (1812) 24, nomen; Spreng. Syst. veg. II (1825) 783; Benth. in DC. Prodr. X, 316; Ldb. Fl. Ross. III, 222; Schmalh. Fl. II. 267; Wulff in Fl. Yugo-Vost. VI, 199.—*lc.*: Fl. Yugo-Vost. VI, fig. 628.

298 Perennial. Plant 15–40 cm tall. Rootstock woody. Stems numerous, woody at base, slender, grayish, densely white glandular-pubescent. Leaves lanceolate or linear, 1–2.5 cm long, 0.2–0.5 cm broad, acute, with a few large teeth along margin, and 2–6 mm long petioles; floral leaves (0.3)0.7–1.2 cm long, 0.2–2 mm broad, with smaller teeth, subentire; margin and lower surface of all leaves diffusely glandular-hairy. Flowers numerous, on 1–3 mm long, glandular-pubescent pedicels; peduncles axillary, glandular-pubescent, 0.5 cm long, supporting 1–3-flowered cymes forming oblong, narrow, 4–12 cm long, 1.5–2 cm broad paniculate inflorescence. Bracts linear, acute, 1.2–2 mm long, subglabrous or sometimes glandular-pubescent along margin. Calyx 2–2.5 mm long, diffusely glandular-hairy; lobes orbicular-ovate, 1.5–1.8 mm long, 1.2 mm broad with narrow white-scarious margin. Corolla dark blood-red, 4.5 mm long; lobes of upper lip orbicular, narrow at base, 3 times as long as lateral lobes of lower lip. Stamens exserted, filaments diffusely glandular-pubescent; staminode oblong, 2–3 times as long as broad, obtuse or sometimes oblong-deltoid and acute, rarely absent. Ovary globose-ovoid, 1 mm long, 0.9 mm broad, yellowish brown, glabrous; style 4 times as long as ovary. Capsule globose, brown, 3 mm long, 3.5 mm broad, smooth, acuminate. Seeds ellipsoid, 1.2 mm long, 0.5 mm broad, dark brown. June to July.

Calcareous slopes.—*European USSR*: Volga-Don, Lower Don. Endemic. Described from Don. Type in Leningrad.

62. *S. canescens* Bong. in Bull. Acad. Sc. Pétersb. VIII (1841) 340; Benth. in DC. Prodr. X, 316; Ldb. Fl. Ross. III, 221; Trautv. in Bull. Soc. Nat. Mosc. XXXIX, 435; Pavl. Fl. tsentr. Kazakhst. III, 139; Kryl. Fl. Zap. Sib. X, 2429.—*lc.*: Bong. and Mey. in Mém. Acad. Sc. Pétersb. ser. VI, II, tab. 12.

Perennial. Plant 25–60 cm tall, mealy grayish or canescent, rarely glabrous (var. *glabrata* Trautv.). Rootstock woody. Stems more or less 4-angled, erect, simple or branched. Leaves oblong-ovate or oblong, (1)1.5–5 cm long, (0.2)1–2 cm broad, obtuse, dentate with narrow, cuneate or pinnatipartite base (var. *glabrata* Trautv.), thick prominent

veins on lower surface, with 3–7(10) mm long, 1–1.8 mm broad petioles; floral leaves oblong, 2.5 mm long, 1 mm broad, acute; all leaves on both surfaces and petioles glandular-pubescent. Flowers numerous, on 3–4 mm long pedicels; cymes 1–3(4)-flowered with 0.5–1 cm long axillary peduncles, forming pyramidal, paniculate, virgate 8–13 cm long, 2 cm broad, narrow inflorescence. Bracts lanceolate, 1.5–2 mm long, 0.3–0.4 mm broad, acute. Calyx 2–2.5(3) mm long, glandular-hairy; lobes 299 elliptical or ovate, 1.3–1.5 mm long, 1.3 mm broad, with narrow scarious margin. Corolla brownish dark purple, 4.5–6(6.5) mm long, 1.3 mm broad, glabrous; upper lip brighter in color, lobes orbicular, narrow at base, 1.5 times as long as lateral lobes of lower lip. Stamens included, filaments glandular-pubescent; staminode oblong, obtuse, 3 times as long as broad. Ovary ovoid, 0.7 mm long and broad, glabrous; style 6 times as long as ovary. Capsule globose or globose-ovoid, 4–5 mm long, 4–4.5 mm broad, acuminate, glabrous. Seeds ellipsoid, 1–1.5 mm long, 0.5–0.7 mm broad, dark brown or black. June to July (Plate XIII, fig. 1).

Pebbly and sandy shores, alkaline meadow soils.—*Western Siberia*: Upper Tobol, Irtysh; *Soviet Central Asia*: Aral-Caspian Region, Balkhash Region, Pamiro-Alai, Tien Shan. Endemic. Described from Zaisan-Nor Lake. Type in Leningrad.

Series 14. *Pruinosae* Gorschk.—Staminode oblong-ovate or oblong, 2–3 times as long as broad. Lobes of upper corolla lip 1.5–3 times as long as lateral lobes of lower lip.

63. *S. zuvandica* Grossh. Opred. rast. Kavk. (1949) 309; Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XIII (1950) 23.

Biennial. Plant 17–30 cm tall, white glandular-hairy throughout. Root simple, branched. Stem simple, almost 4-angled below, dark purple, glandular-pubescent, leafy almost up to middle. Leaves oblong-ovate, deeply pinnatisect, 1.5–4.5 cm long, 0.6–1.8 cm broad, with numerous narrowly lanceolate, (1)2–5 mm long, 0.5–1 mm broad, acute lobes. Flowers sessile or with glandular, 1 mm long pedicels; cymes 1–3-flowered with 2 mm long, glandular-pubescent, axillary peduncles forming 7–10 cm long, 1.2–2 cm broad, narrow paniculate inflorescence. Bracts linear-lanceolate, 1–2 mm long, 0.5 mm broad, acute, densely glandular-puberulent. Calyx 2–2.3 mm long, densely glandular-puberulent; lobes ovate-orbicular, 1.8–2 mm long, 1.3 mm broad, green, sometimes dark purple in upper part, with narrow white margin. Corolla dark purple, 4.5 mm long, 3–4 mm broad; lobes of upper lip orbicular, narrowed at base, 1.5 times as long as lateral lobes of lower lip. Stamens exerted, filaments glandular-pubescent; staminode oblong, 1.5–2 times as long as broad, dark purple. Ovary globose, 1 mm long, glabrous; style 4 times as long as ovary. Capsule globose, beaked. Seeds not known. May.

On pebbly beds of mountain rivers.—*Caucasus*: Talysh. Endemic. Described from Talysh. Type in Leningrad.

*Note*. The species stands apart in the group of species with long staminodes. It is well distinguished from the other species of this group by the glandular pubescence, deeply pinnatisect leaves, broad, uniformly colored, dark purple staminode, 1.5–2 times as long as broad.

64. *S. pruinosa* Boiss. Diagn. pl. or. I, 12 (1853) 38; Fl. or. IV. 416.—*S. rosulata* Stiefelhag. in Bot. Jahrbüch. 44 B (1910) 475; O. and B. Fedtsch. Perech. rast. Turkest. 5, 86; Fedtsch. Rast. Turkest. 693.

Biennial. Plant 20–60 cm tall, densely covered all over, except flowers, with numerous, white, calcified, round, flat, short-stalked hairs. Root vertical, simple, 3–6 mm in diameter. Stems erect or somewhat ascending, simple or more or less branched. Leaves almost all radical, fleshy, numerous (10–20), rosette-forming, oblong-elliptical or ovate-lanceolate, 1.5–5(7) cm long, 1.3 cm broad, coarsely sundebtate-lobed or lyrate-pinnatipartite; lateral lobes oblong, 0.8–1.8 cm long, 0.2–0.8(1) cm broad, dentate; terminal lobe 2 cm long, 1.5 cm broad, oblong, incised, with acute, denticulate, crispate lobes; petioles 0.8–3.5(4) cm long; cuneate leaves (1–2) lanceolate, 1–2.5 cm long, 0.5–1.5 cm broad, acute, often more incised and sometimes bi-pinnatipartite, denticulate, sessile, or with 2.6 mm long petioles; floral leaves oblong-lanceolate, 0.4–1.6 cm long, 1.5–6 mm broad, acute, upper ones entire, lower coarsely dentate; lower surface of all leaves with prominent veins. Flowers numerous, on 2–4 mm long, divaricate pedicels; cymes 3–5-flowered, uniformly spaced, with 0.5–1.2 cm long peduncles, forming 4–23 cm long, 1.4 cm broad sparse, paniculate inflorescence. Bracts oblong, 2 mm long, or lanceolate and 1 mm long. Calyx 2.3–2.5(3) mm long, 1/2 as long as corolla; lobes orbicular or ovate, 2 mm long and broad, with broad scarious margin. Corolla blood-red or purple, 5 mm long, 3 mm broad, glabrous; upper lip brighter in color, lobes orbicular, narrowed at base, 3 times as long as lateral lobes of lower lip. Stamens exserted, filaments glandular-pubescent; staminode oblong or oblong-ovate, 2 times as long as broad, obtuse. Ovary 1.2 mm long, 1 mm broad, ovoid, glabrous; style 3 times as long as ovary. Capsule globose, 4–5 mm long, smooth, acuminate. Seeds oblong, 1 mm long, 0.7 mm broad, dark brown, obtuse. May to July (Plate XIII, fig. 3).

In mountains, on slopes and debris.—*Soviet Central Asia*: mountainous Turkmenia. *General distribution*: Iran. Described from Elburz Mts. Type in Leningrad.

65. *S. dissecta* (B. Fedtsch.) Gorsch. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XIV (1951) 445.—*S. pruinosa* Boiss. var. *dissecta* B. Fedtsch. in herb. nomen.



- 301 Biennial. Plant 30–50 cm tall, covered all over, except corolla and ovary, with white calcified flat, scattered, short-stalked glandular hairs. Root simple, vertical. Stems numerous, almost 4-angled, simple or branched, reddish brown, densely leafy. Leaves oblong-elliptical, 5–10 cm long, 2–3.5 cm broad, all repeatedly pinnatisect, lateral segments 1–2.5 cm long, 4–8 cm broad, with 3–5 mm long, 1.5–2 mm broad, dentate, acute lobes, and the terminal segment larger, 1.7–2.5 cm long, 1–1.2 cm broad, oblong, incise-lobed, acute, with 2.5–8 mm long, 2–4 mm broad, acute, denticulate lobes; lower leaves lobed or sometimes entire, all with 1–4.5 cm long petioles; floral leaves 0.3–2.5 cm long, 0.1–0.7 cm broad, oblong-lanceolate, acute, entire or lower ones coarsely dentate or incise-lobed. Flowers numerous, on 1–2 mm long pedicels; cymes 1–3-flowered with axillary, 0.5–1.5 cm long peduncles, forming 7–20 cm long, 1–4 cm broad sparse panicle inflorescence. Bracts oblong-linear, 1–2 mm long. Calyx 2.5 mm long, lobes orbicular or ovate, 2 mm long, 1.5 mm broad, margin brown- or white scarious-dentate. Corolla purple or blood-red, 4.5–4.7(5) mm long, 3.7–4 mm broad, smooth; lobes of upper lip orbicular, narrowed at base, 2 times as long as lateral lobes of lower lip. Stamens exserted, filaments glandular-pubescent; staminode oblong, obtuse, 3 times as long as broad. Ovary 0.8 mm long, globose, glabrous; style 5 times as long as ovary. Capsule and seeds not known. May to June (Plate XIII, fig. 4).

Mountains.—*Soviet Central Asia*: mountainous Turkmenia. Endemic. Described from Nukhur. Type in Leningrad.

Series 15. *Caninae* Gorschk.—Staminode obovate, oblong, lanceolate or oblanceolate, acute or tridentate, sometimes diffusely glandular-pubescent, sometimes whitish along margin, 2–3 times as long as broad. Corolla sometimes pubescent, lobes of upper lip 2–4 times as long as lateral lobes of lower lip.

66. *S. canina* L. Sp. pl. (1753) 621; Ldb. Fl. Ross. III. 221; Boiss. Fl. or. IV, 419; Schmalh. Fl. II, 267.—*S. bicolor* Sibth. and Sm. Fl. Gr. I (1806) 437.—*S. lucida* Pall. ex M.B. Fl. taur.-cauc. II (1808) 77, non L.—*S. chrysanthemifolia* Willd. Hort. Berol. I (1816) 59.—*Tomiphyllum caninum* Fourr. in Ann. Soc. Linn. Lyon. n. s. XVII (1869) 125.—*T. tenuisectum* Fourr. l.c. 125.—*l.c.*: Rchb. Ic. fl. germ. XX, tab. 1671; Hegi Illustr. Fl. Mittel-Eur. VI, I, tab. 236.—*Exs.*: Fl. Cauc. exs. No. 99; Fl. exs. austro-hung. No. 3705; Fl. call. and germ. exs. No. 721; Fl. Ital. exs. ser. II, No. 1117.

- 302 Perennial. Plant glabrous, 30–60 cm tall. Stems numerous, virgate, woody at base, erect or ascending, simple or sometimes branched. Leaves oblong-ovate, 2.5–3(7) cm long, 1.5–2.5(4) cm broad, pinnatisect, lower leaves with 1.5–3 cm long petioles, dissected into oblong-lanceolate or



obovate 1–1.5(3) cm long, 0.2–0.5(1) cm broad, incise-serrate or sometimes incised segments, upper segments obovate, 1.5–2.5 cm long, 5–8 mm broad, confluent at base; upper leaves sessile, 2.5 cm long and broad, segments usually narrowly lanceolate, rarely linear, coarsely serrate; floral leaves linear, 2–4 mm long, 0.3–0.5 mm broad, acute. Flowers numerous, sessile or on glandular-pubescent, 0.5–1 mm long pedicels; cymes 2–9-flowered, forked with glandular, axillary, 0.5–0.8 cm long peduncles, forming 15–30 cm long, 2.5–3.5 cm broad paniculate inflorescence. Bracts linear, 1.8 mm long, acute, glabrous. Calyx 2 mm long, smooth; lobes orbicular, 1.6 mm long, 1.2 mm broad, with broad, white-scarious margin. Corolla purple or dark red, 3.5 mm long; lobes of upper lip orbicular, narrowed at base, whitish along margin, 3–4 times as long as lateral lobes of lower lip. Stamens exserted, filaments glandular-pubescent; staminode lanceolate, acute, 2.5 times as long as broad sometimes absent. Ovary ovoid-globose, yellowish brown, 1 mm long and broad, glabrous; style 3.5 times as long as ovary. Capsule ovoid-globose, 4 mm long, yellowish brown, smooth, acuminate. Seeds ellipsoid, 1.7 mm long, 0.7 mm broad, dark brown. May to June.

Stony places.—*European USSR*: Crimea. *General distribution*: Central and Atlantic Europe, Mediterranean Region, Balkan States-Asia Minor, North Africa. Described from Switzerland. Type in London.

67. *S. variegata* M.B. Tabl. Prov. occid. Casp. (1798) 58; Fl. taur-cauc. II (1808) 78; Benth. in DC. Prodr. X, 314; Boiss. Fl. or. IV, 417; Schmalh. Fl. II, 267; Grossh. Fl. Kavk. III, 378.—*S. urvilleana* Wydl. in Mém. Soc. Phys. Génèv. IV (1828) 160.—*S. ani* C. Koch in Linnaea, XVII (1843) 285.—*S. bicolor* Gueldenst. ex Ldb. Fl. Ross. III (1846–1851) 221.—*S. diffusa* Somm. and Lev. in Nuov. Giorn. Bot. Ital. ser. II, IV (1897) 205.—*Ic.*: Rchb. Ic.- pl. crit. III, tab. 257; Tr. Bot. sada, XVI, Plate XXXVIII.

Perennial. Semishrub, covered (except bracts and flowers) with glandular, white, sometimes also brown hairs, rarely glabrous (var. *glabra* Gorschk.). Rootstock woody. Stems numerous, simple or sparingly branched, reddish. Leaves oblong, 1–1.5 cm long, 0.6–0.8 cm broad, deeply pinnatifid or pinnatipartite; lobes lanceolate or linear-lanceolate, 1–6 mm long, 1–2 mm broad, incise-dentate or pinnatifid or sometimes  
 303 leaves incise-serrate; floral leaves acute, white-hairy, rarely glabrous (var. *glabra* Gorschk.). Flowers on 2–4 mm long pedicels; cymes 1–3(5)-flowered with axillary, 5–7 mm long peduncles forming 3–11(15) cm long, 2–3 cm broad, lax, pyramidal, oblong, narrow inflorescence. Bracts linear, glabrous, acute, 3 mm long, 1 mm broad. Calyx 1.5–2 mm long, glabrous; lobes orbicular, 1.4 mm long, 1.3 mm broad, with broad white-scarious margin. Corolla variegated, 3–3.5(4) mm long, yellowish; lobes

of upper lip dark red, orbicular, narrowed at base, 2.5 times as long as lateral lobes of lower lip. Stamens exerted, filaments glandular-pubescent; staminode obovate or ovate-spatulate, sometimes oblong, 2 times as long as broad. Ovary 1 mm long and broad, globose, glabrous; style 4 times as long as ovary. Capsule 3–4 mm long and broad, globose, glabrous, acuminate. Seeds ellipsoid, 0.7–1 mm long, 0.5–0.7 mm broad, yellowish brown. May to August.

In middle mountain zone, on dry stony slopes, among mountain steppe vegetation.—*Caucasus*: Ciscaucasia, Dagestan, eastern and southern Transcaucasia. Talysh. *General distribution*: Armenia-Kurdistan. Described from Caucasus. Type in Leningrad.

68. *S. thesioides* Boiss. and Buhse in Nouv. Mém. Soc. Nat. Mosc. XII (1860) 164; Boiss. Fl. or. IV, 419; Grossh. Fl. Kavk. III, 378.—*S. xanthoglossa* Stiefelhag. in Bot. Jahrb. 44 B (1910) 473, non Boiss. p. p.

Perennial. Plant glabrous, 25–50 cm tall. Root straight, branched in lower part. Stems numerous, erect, slender, virgate, reddish, paniculately branched above. Leaves pinnate, 3–5 cm long, 1.3 cm broad, with 0.6–1 cm long petioles, in 1–3 pairs, lobes narrow-lanceolate, generally linear, 0.5–1.5 cm long, 0.5–1.2 mm broad, entire, terminal lobes up to 3 cm long; floral leaves entire, lanceolate, 1.5–2.5 mm long, 0.7–1 mm broad, almost equaling peduncles. Flowers on glabrous or diffusely glandular-pubescent, (1)3–4 mm long pedicels; cymes 3–5-flowered with sparsely glandular-hairy, axillary peduncles forming (6)10–18(35) cm long, 0.8–4.5 cm broad paniculate, divaricate inflorescence. Bracts linear, 2–3 mm long, shorter than or slightly exceeding calyx, glabrous. Calyx 2.5–2.7 mm long, glabrous; lobes or orbicular, 1.8–2 mm long and broad, greenish brown, with broad white-scarious margin. Corolla purple, 4.5–5 mm long; lobes of upper lip purplish violet, orbicular, narrowed at base, 2 times as long as lateral lobes of lower lip, the latter yellowish-white at tips. Stamens exerted, filaments glandular; staminode oblong, acute, purple, whitish along margin, 2.5 times as long as broad, diffusely glandular-pubescent. Ovary globose, 0.7 mm long and broad, glabrous; style 5 times as long as ovary. Capsule ellipsoid, 3.5–4 mm long, 2.5 mm broad, light brown, smooth. Seeds oblong, more or less compressed, 1–1.5 mm long, 0.7 mm broad, dark brown. May (Plate XIII, fig. 2).

In middle mountain zone, on rubbly debris and gypsiferous, clayey slopes.—*Caucasus*: Southern Transcaucasia, Talysh. Endemic. Described from Nakhichevan Region. Type in Leningrad.

69. *S. turcomanica* Bornm. and Sint. ex Reching. in Anzeig. math. nat. Klasse Oest. Akad. Wissensch. Jahrg. 1950, No. 4, 93.—*S. turcomanica* Bornm. and Sint. in sched.; O. and B. Fedtsch. Perech. rast.

Turkest. 5, 87, nom. nud.—*S. frigida* Stiefelhad. in Bot. Jahrb. 44 B (1910) 476, p. p. non Boiss.

Perennial. Plant 30–60 cm tall, glabrous. Rootstock woody, more or less thickened, branched. Stems numerous, 4-angled. Lower leaves more or less rosette forming, 2.6 cm long, 1–1.5 cm broad, pinnatifid, with 2 cm long petioles, lobes oblong, acute, 6–8 mm long, 2 mm broad; cauline leaves 2–3 cm long, 0.7–1 cm broad, elliptical, pinnatifid or dentate, with 1.2 cm long petioles, lobes oblong, 4.6 mm long, 1.5–2 mm broad, acute; floral leaves oblong, 0.4–1 cm long, 0.1–0.2 cm broad, subacute. Flowers on 2 mm long pedicels; cymes 1–5-flowered with axillary peduncles forming 20 cm long, 3–4 cm broad, paniculate, narrow, sparse inflorescence, both pedicels and peduncles diffusely glandular-pubescent. Bracts linear, 1–2.5 mm long, 1–2 mm broad, acute, glabrous. Calyx smooth, (2)2.5–3 mm long; lobes orbicular-elliptical, 2 mm long, 1 mm broad, with narrow white margin. Corolla dark red, 5–6 mm long; lobes of upper lip almost reniform, narrowed at base, 2 times as long as flat lateral lobes of lower lip. Stamens included filaments glandular-pubescent; staminode lanceolate, 2–3 times as long as broad, acuminate. Ovary globose, 1.5 mm long and broad; style 3 times as long as ovary. Capsule globose, (3)4–5 mm long, smooth, with acute, up to 2 mm long beak. Seeds ellipsoid, dark brown, 1–1.2 mm long, 0.7 mm broad. April to June.

On rubby slopes, in ravines (at altitudes of up to 1500 m) and in coastal areas.—*Soviet Central Asia*: Aral-Caspian Region (Ustyurt), mountainous Turkmenia, Kara Kum (Krasnovodsk), Pamiro-Alai (Kugitang). Endemic. Described from Krasnovodsk. Type in Vienna.

70. *S. czapandaghii* B. Fedtsch. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XIV (1951) 437.

Perennial. Plant (30)40–60 cm tall, covered all over, except ovary and capsule, with scattered glandular hairs. Stems numerous, erect or somewhat ascending, 4-angled. Leaves oblong-elliptical, 3–4 cm long, 1.5–2 cm broad; upper leaves 1.5–2 cm long, 1–1.2 cm broad, pinnatifid, lobes generally pinnatisect, subacute, 0.4–1.2 cm long, 2.5 mm broad; petioles 2 cm long; floral leaves lanceolate or linear in upper part of inflorescence, 0.6–1 cm long, 0.2 cm broad, sometimes scarcely parted, sessile. Flowers on 2–6 mm long pedicels, single or in 2–3-flowered cymes with axillary, 0.7–1.8 mm long peduncles, forming 6–20 cm long, 1.5–3 cm broad lax racemose inflorescence. Bracts linear-lanceolate, 1.2 mm long, 0.5 mm broad. Calyx 2–2.5 mm long, lobes elliptical or suborbicular, 1.5 mm long, 1.5–1.8 mm broad, with narrow white-scarious margin. Corolla dark purple, 4.5–5 mm long, diffusely glandular-pubescent outside, lobes of upper lip orbicular, narrowed at base, 3 times as long as lateral lobes of lower



lip. Stamens exserted; filaments glandular-pubescent; staminode oblanceolate, 2 times as long as broad, tridentate above. Ovary globose, 1.5 mm long, glabrous; style 2 times as long as ovary. Capsule globose, smooth, 4–5 mm long and broad, beak as long. Seeds 1.5 mm long, 0.5 mm broad, ellipsoid, dark brown, with narrow scarious margin. June to August.

Near snowline in high-mountain zone.—*Soviet Central Asia*: mountainous Turkmenia. Endemic. Described from the summit of Chapandag. Type in Leningrad.

Series 16. *Kabadianenses* Gorschk.—Staminode oblong, acuminate, 2–3 times as long as broad. Lobes of upper corolla lip slightly exceeding lateral lobes of lower lip.

71. *S. kabadianensis* B. Fedtsch. in O. and B. Fedtsch. Perech. rast. Turkest. 5 (1913) 86; Fedtsch. Rast. Turkest. 693.

Perennial. Plant glabrous, 10–20 cm tall. Root 0.8–1.8 cm in diameter, somewhat woody, more or less straight. Stems ascending, numerous, smooth. Leaves glabrous, elliptical, pinnatipartite, lower usually all radical, 1.7 cm long, 1 cm broad, lobes lanceolate, coarsely dentate, subacute, 2–4(6) mm long, 1.5 mm broad, terminal lobe 5 mm long, 3 mm broad, obovate, with a few large teeth; petioles 0.6–1 cm long; cauline leaves few, 0.8 cm long, 3 mm broad, pinnatipartite; floral leaves oblong, subacute, 2 mm long, 0.3 mm broad. Flowers on glandular-pubescent, 2 mm long pedicels; cymes 1–2-flowered with 4–9 mm long peduncles covered with scattered, brown, glandular hairs; inflorescence paniculate, 3.5–4 cm long, 1.2–1.5 cm broad. Bracts oblong, 0.7 mm long, acute, glabrous. Calyx glabrous, 1.8 mm long; lobes oblong, subobtuse, 1 mm long, 0.8 mm broad, with narrow white-scarious margin. Corolla violet, 4 mm long, lobes of upper lip orbicular, narrowed at base, slightly exceeding lateral lobes of lower lip. Stamens exserted, filaments glandular-pubescent; 306 staminode oblong, 3 times as long as broad, acuminate. Ovary globose, 1 mm long and broad, glabrous; style 3 times as long as ovary. Capsule globose, 3–3.5 mm long and broad, smooth, acuminate. Seeds oblong-ellipsoid or ovoid, 1.5 mm long, 1.2 mm broad, dark brown. April.

Mountains.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from Khoja-Kadian near Kabadian. Type in Leningrad.

72. *S. sangtodensis* B. Fedtsch. in O. and B. Fedtsch. Perech. rast. Turkest. 5 (1913) 86; Fedtsch. Rast. Turkest. 693.

Biennial. Plant up to 40 cm tall, glabrous. Root slender. Stems numerous, erect. Leaves pinnatipartite, 3–4(7) cm long, 1.3 cm broad, sessile, lobes oblong, 0.5–1 cm long, 2 mm broad, terminal lobe 2 cm long, lobes subacute, incised. Flowers sessile or on short, 1 mm long pedicels; racemes 1–3-flowered on common peduncles forming 25–30 cm long



lax, broadly paniculate inflorescence. Bracts deltoid-lanceolate, 1–1.2 mm long, 0.5 mm broad, acute. Calyx 1.5 mm long; lobes oblong-ovate, 1.5 mm long, 1 mm broad, with scarious margin. Corolla brownish 3.5 mm long; lobes of upper lip orbicular; narrowed at base, slightly exceeding lateral lobes of lower lip. Stamens exserted; staminode oblong; 2–2.5 times as long as broad, subacute. Ovary globose, 0.7 mm long and broad, glabrous; style 6 times as long as ovary. Capsule globose, 3–4 mm long, 3.5 mm broad. Seeds ellipsoid, 1.5–1.7 mm long, 1–1.3 mm broad, dark brown. May to June.

Red-sand hills along river banks.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from Vakhsh River, above Zangtoda (600–800 m). Type lost?

*Note.* The question of the separate status of this species remains open, since only one specimen is available. It was collected by M.G. Popov near the city of Baljuan on July 25, 1914 (No. 573). B.A. Fedtschenko, even in the original description of the species noted: “we are describing it on the basis of an imperfect specimen, hence opinion on this species is subject to reconsideration.”

Series 17. *Incisae* Gorschk.—Staminode lanceolate or oblong, obtuse, sinuate or sometimes acuminate, 2–2.5 times as long as broad. Lobes of upper corolla lip 1.5 times as long as lateral lobes of lower lip.

73. *S. kiriloviana* Schischk. nom. n.—*S. pinnata* Kar. and Kir. in Bull. Soc. Nat. Mosc. XIV, 4 (1841) 719, non Mill. (1768); Ldb. Fl. Ross. III, 221; Fisch. and Mey. Ind. sem. hort. Petrop. X, 58; O. and B. Fedtsch. Perech. rast. Turkest. 5, 88; Fedtsch. Rast. Turkest. 694.—*S. incisa* Weinm. var. *alpina* Kar. and Kir. in Bull. Soc. Nat. Mosc. XV (1842) 414; Kryl. Fl. Zap. Sib. X, 2428.—*S. incisa* Weinm. var. *major* Ldb. Fl. Ross. III (1847–1849) 212; Kryl. l.c. 2428.—*S. incisa* Weinm. var. *pinnata* Trautv. in Bull. Soc. Nat. Mosc. XXXIX (1866) 435; Kryl. l.c. 2428.

Perennial. Plant up to 85 cm tall, glabrous, except pedicels and peduncles. Stems usually numerous, erect, obscurely winged, dark red. Leaves pinnatisect or sometimes deeply incised at base or upper leaves incisedentate (var. *subpinnata* Fisch. and Mey.), 6–8(11) cm long, 2.5–4(7.5) cm broad; lobes linear-lanceolate or linear-oblong, 1.2–1.5 cm long, 3–5 mm broad, incised serrate-dentate, teeth mucronate; petioles 0.5–2(4) cm long; floral leaves linear, 0.7–1 cm long, 0.5–0.8 mm broad, acute. Flower numerous, on glandular-pubescent, 1.8–2.5 mm long pedicels; cymes 2–6-flowered with glandular-hairy 0.7–1 cm long peduncles, forming 7–25 cm long, 2 cm broad, narrow paniculate inflorescence. Bracts linear-lanceolate, 1–1.5 cm long, glabrous or sometimes glandular-pubescent along margin, acute. Calyx 2–2.3 mm long, glabrous; lobes orbicular, 1.5 mm long, 2 mm broad, with broad scarious margin. Corolla dark purple, 5.5–6(7) mm long,

3 mm broad; lobes of upper lip orbicular, narrowed at base, 2 times as long as paler lateral lobes of lower lip. Stamens exserted, filaments densely glandular-hairy; staminode lanceolate, 2.5 times as long as broad, obtuse, with a small sinus or sometimes tapering. Ovary globose, 1.2 mm long, 1.5 mm broad; style 1/3 as long as ovary. Capsule 5–6 mm long, 5 mm broad, smooth, acuminate. Seeds oblong-ellipsoid 1–1.2 mm long, 0.5 mm broad, dark brown. May to July.

In tall-grass subalpine meadows and near coniferous forest edges.—*Soviet Central Asia*: Balkhash Region, Dzh.-Tarbagatai, Pamiro-Alai, Tien Shan. *General distribution*: Dzh.-Kashgar (Kuldzha). Described from Tarabagatai, Chegarak-Assu. Type in Leningrad.

74. *S. incisa* Weinm. Bot. Gart. Univ. Dorp. (1810) 136; Bge. in Ldb. Fl. alt. II, 442; Ldb. Fl. Ross. III, 219; Turcz. Fl. baic.-dah. II, 333; Trautv. in Bull. Soc. Nat. Mosc. XXXIX, 434; Kom. Fl. Man'chzh. III, 413; Kryl. Fl. Alt. IV, 932; O. and B. Fedtsch. Perech. rast. Turkest. 5, 88; Fedtsch. Rast. Turkest. 693; Kryl. Fl. Zap. Sib. X, 2428.—*S. gmelini* Turcz. ex Benth. in DC. Prodr. X (1828) 311.—*S. patriniana* Wydler, Essai Mon. Scrophul. (1828) 39.—*S. incisa* Weinm. var. *pamirica* O. Fedtsch. and var. *angustifolia* O. Fedtsch. in Tr. Bot. sada, XXI (1903) 391.—*Ic.*: Ldb. Ic. Fl. Ross. II, tab. 156.

308 Perennial. Plant 10–45 cm tall. Root thick, woody, brown. Stems erect, ascending or procumbent (f. *procumbens* Kryl.), glabrous, blood-red at base, dark green above, sometimes glandular-pubescent. Leaves oblong-elliptical or ovate-lanceolate, 2–7(11) cm long, 0.5–2.5(6) cm broad, with narrow cuneate base, more or less subacute, with prominent veins, entire, or with acute large teeth along margin (var. *integra* Trautv.) or sometimes doubly dentate (f. *bidentata* Kryl.), or almost incised or lyrate-pinnatifid (var. *sublyrata* Kryl. and Segr.), with 1–2.5 cm long petioles; floral leaves narrow, lanceolate, 2 cm long, 0.5 cm broad, with 2–4 mm long or longer petioles, upper floral leaves in inflorescence linear, 7 mm long, 0.7 mm broad, sessile, acute; leaves generally glabrous or sometimes diffusely glandular-hairy. Flowers with 1–2(5) mm long pedicels, covered, along with peduncles, with glandular, minute, brown hairs; cymes 1–6 or 1–2(3)-flowered (f. *pauciflora* Kryl.) with 0.2–0.5 cm long peduncles forming 7–25 cm long, (1)2–3 cm broad, narrow paniculate inflorescence. Bracts linear or linear-lanceolate, 1.5–3(4) mm long, glandular-pubescent, acute. Calyx 2 mm long, glabrous or diffusely glandular-hairy at base; lobes orbicular, purple, 1.3 mm long, 1.8 mm broad, with narrow scarious margin. Corolla dark purple, 6–8 mm long, 2.5 mm broad; lobes of upper lip orbicular, narrowed at base, darker in color, 1.5–2 times as long as lateral, paler, striped lobes of lower lip. Stamens exserted, filaments glandular-pubescent, anthers dark purple; staminode oblong, 2 times as

long as broad, obtuse, sinuate or sometimes more or less acuminate. Ovary ovoid, dark brown, 1.5 mm long, 1.2 mm broad; style 1.5 times as long as ovary. Capsule globose-ovoid, (4)5–6.5 mm long, 3.5 mm broad, greenish- or violet-brown. Seeds oblong-ellipsoid, 1–1.2 mm long, 0.5–0.7 mm broad, dark brown. May to July.

In subalpine belt and below, in mountain steppe valleys and shrubby thickets and valleys along banks of rivers and lakes in plains.—*Western Siberia*: Irtysh, Altai; *Eastern Siberia*: Angara-Sayan, Dauria; *Soviet Central Asia*: Aral-Caspian Region, Balkhash Region, Dzh.-Tarbagatai, Syr Darya, Pamiro-Alai, Tien Shan. *General distribution*: Mongolia. Described from Siberia. Type lost.

*Note*. Closely resembling *S. pinnata* Kar. and Kir., but extremely variable in the size and shape of the leaves and in the number of flowers on the peduncles; stems erect to decumbent; leaf margin dentate to deeply pinnatisect.

### Genus 1332. *PENTASTEMON*<sup>1, 2</sup> L'Hérit.

L'Hérit. ex Schreber, Gen. II (1791) 808

309 Calyx 5-partite, usually densely pubescent. Corolla red, violet, sky-blue or white, rarely pale yellow, with long, cylindrical, mostly inflated, vesicular tube and bilabiate limb; upper lip concave at base, bilobed or bipartite up to base, lower lip divergent, trifid. Stamens 5, 4 fertile, with filaments divergent at base, ascending above, equaling or 1/2 as long as the fifth sterile stamen with subulate filament, often broadened above, clavate, glabrous, or barbate; stigma capitate. Capsule bivalved; valves entire. Seeds numerous, curved, angular, pointed. Flowers large, numerous, on pubescent branched pedicels with two bracteoles, forming dense, terminal, paniculate or fasciculate inflorescence, leafy at base; sometimes flowers single, opposite in a simple raceme. Perennial herbs or semishrubs, branched, with large opposite leaves.

This genus includes over 100 species growing mainly in North America and a few in the northeast of Asia.

1. *P. frutescens* Lamb. in Trans. Linn. Soc. London, X (1811) 259; Benth. in DC. Prodr. X, 321; Ldb. Fl. Ross. III, 222; Kom. Fl. pol. Kamch. III, 65.—*Digitalis dasyantha* Pall. ex Ldb. l.c.—*Chelone frutescens* Spreng. ex Ldb. l.c.—*l.c.*: Lamb. l.c. tab. 6, fig. 1.

Perennial. Plant 8–15 cm tall. Rootstock dichotomously branched. Branches angular, ribbed, generally erect, densely pubescent in upper part

<sup>1</sup> Treatment by S.G. Gorschkova.

<sup>2</sup> From the Greek penta—five and stemon—indicating the number of stamens, one of which is sterile.



with white, short, broad unicellular hairs. Leaves lanceolate or oblong, 3.5–7 cm long, 1.2–4 cm broad, somewhat coriaceous, obtuse, entire or regularly sharply denticulate, ciliate, glabrous, sessile, subamplexicaul. Flowers 3–9; pedicels 3.7 cm long, slender, pubescent with multicellular, long, white, simple and glandular, clavate hairs, 2–3 times as long as calyx. Flowers in a simple 3–5 cm long, 6 cm broad raceme or corymb; bracteoles linear, obtuse, glandular-pubescent, 5 mm long, 0.7 mm broad. Calyx 5-partite, 1.3–1.5 cm long; lobes linear-lanceolate, acute, 1.3 cm long, 0.3 cm broad, covered with broad, generally multicellular, long, glandular, clavate hairs and simple, sparse, fine, long white hairs. Corolla 2.5–3 cm long, bright lilac or sky-blue, tube 2 cm long, 1.2 cm broad, covered outside with sparse simple hairs, limb bilabiate; upper lip 1 cm long, 1.2 cm broad, bilobed; lobes oblong, orbicular, obtuse, 7 mm long, 6 mm broad; lower lip 3-lobed, inner base of middle lobe barbate; lobes oblong, obtuse, 0.9 cm long, 0.5 cm broad. Anthers black, lanate. Ovary oblong; 310 smooth, yellowish brown, 3 mm long, 0.7 mm broad; style slender, 9 mm long; stigma capitate. Capsule 8–9 mm long, 4 mm broad, oblong-conical, yellowish brown, smooth, dehiscent by two valves. Seeds 1 mm long, 0.7 mm broad, ellipsoid-trigonal, brown. May to July.

In mountains, lower part of alpine and subalpine zones on stony debris and in valleys of mountain rivers and rivulets.—*Soviet Far East*: Kamchatka, Okhotsk (region), Sakhalin (and Kuril Islands). *General distribution*: Japan (north) and North America. Described from Kamchatka and Unalaska. Type in London.

Tribe 3. GRATIOLEAE Wettst. in Pflanzenfam. IV, 3b (1895) 69.—Corolla bilabiate, without spur or umbo, flowers solitary or in racemes.

### Genus 1333. *MIMULUS*<sup>1, 2</sup> L.

L. Sp. pl. (1753) 634; Benth. in DC. Prodr. X (1846) 368; Grant in Ann. Miss. Bot. Gard. II (1924) 99.

Calyx tubular or campanulate, generally plicate, 5-angled, with 5 usually unequal teeth and in such case distinctly bilabiate, often accrescent. Corolla more or less distinctly bilabiate or with almost identical lobes, blue, red, reddish purple, yellow or (rarely) white, tube broadened upward into "throat" (limb along with the upper broadened part of tube); upper lip bilobed, erect or recurved, lower lip usually long, 3-lobed, recurved, usually with two hairy projections in mouth. Stamens 4, didynamous,

<sup>1</sup> Treatment by I.V. Novopokrovsky.

<sup>2</sup> From the Greek *mimos*—comedian, because of the resemblance of the flower to a masked actor.



filaments usually glabrous, inserted in lower part of corolla tube; anthers sagittate. Style glabrous or pubescent, usually exceeding stamens; stigma bifid or peltate-infundibuliform, with equal or unequal lobes. Capsule bilocular, dehiscent by valves; placenta in fruit separating or its halves remaining joined to valves; entire or 2-partite placental column exposed in center of fruit during dehiscence. Annual or perennial herbs, glabrous or glandular-pubescent, sometimes viscid, with opposite, entire, dentate or sometimes lobed leaves and with solitary axillary flowers, sometimes in lax racemes.

About 60 species, distributed mainly in subtropical America. Some of them are cultivated as ornamental plants.

311 Five or perhaps 6 of these species, are found in USSR. Three of them are natives of Far East and 3 (introduced from America) are found in European part of USSR. All these belong to subgenus *Synplacus* Grant (*Sumplacus*, to be correct).

1. Flowers blue; leaves oblong or oblong-lanceolate, sessile; plant entirely glabrous ..... 1. *M. ringens* L.
- + Flowers yellow; leaves ovate, ovate-orbicular or oblong-ovate; plants somewhat pubescent or glabrous ..... 2.
2. Plant soft-villous; calyx teeth long, narrow (lanceolate); calyx limb at least 2/3 as long as tube ..... 6. *M. moschatus* Dougl.-Lindl.
- + Plant glabrous or puberulent; calyx teeth narrow or broad, but shorter; calyx limb 1/3–1/2 as long as tube or shorter ..... 3.
3. Calyx teeth extremely unequal; posterior much longer than others, anterior teeth bent upward and after shedding of corolla, nearly close calyx mouth ..... 4.
- + Calyx teeth similar or nearly so ..... 5.
4. Flowers large; calyx 8–17 mm long, up to 25 mm long in fruit; plant up to 50 cm tall or more, all parts larger ..... 2. *M. guttatus* DC.
- + Flowers smaller; calyx about 4(5) mm; 9 mm in fruit; plant about 15 cm tall, with smaller parts ..... 3. *M. pilosiusculus* H.B.K.
5. Flowers few (1–5), large, 3–3.5 cm long; calyx teeth somewhat broadly membranous, often with acute sinuses in between; pedicels long, much longer than bracts; plant tall, reaching 35 cm, sparsely puberulent above, with long stolons at base bearing highly reduced leaves ..... 5. *M. stolonifer* Novopokr.
- + Flowers more numerous, small, up to 10–12 mm long, on very short pedicels, not exceeding petioles of bracts; calyx teeth fine, at almost truncate calyx margin or with broad, obtuse sinuses in between; plant entirely glabrous; smaller in all parts, not forming stolons with extremely reduced leaves ..... 4. *M. tenellus* Bge.

Section 1. *Eumimulus* Gray in Proc. Am. Acad. II (1872) 97; Syn. Fl. N. Amer. 2, 276, ed. 2 and suppl. (1888); Grant in Ann. Miss. Bot. Gard. II, 126.—Calyx prismatic, acute-angled, not or slightly inflated in  
 312 fruit; teeth equal. Corolla blue to white. Anthers and style glabrous. Stigma lobes identical. Capsule membranous, about as long as calyx, dehiscent up to base along both sutures; placental column 2-partite above. Of the five species of this section, only one is found in USSR.

1. *M. ringens* L. Sp. pl. (1753) 634; Georgi, Besch. Russ. Reichs III, 4, 1112; Ldb. Fl. Ross. III, 223; Curtis Bot. Mag. I, 8, 283; Grant in Ann. Miss. Bot. Gard. 127.—*lc.*: Curtis, l.c.; Britt. and Brown, Illustr. fl. N. Amer. ed. 3, 190, f. 3775.

Annual. Plant glabrous throughout. Stem 0.4–1 m tall, erect, fistular, but rather strong, up to 3–4 mm thick in middle part, 4-angled, rather densely leafy. Leaves oblong-lanceolate or oblong, acuminate, 2.5–10 cm long; middle cauline about 2.5 cm broad, pinnate-veined, with 5–6 ascending arching veins, slightly narrowed into amplexicaul base, rarely into short broadly winged petiole, often auriculate, encircling stem, serrate, with numerous teeth. Pedicels thick, 2–3.5 cm long, usually shorter than bracts. Calyx tubular, slightly curved, upper margin ciliolate, broad-oblong in fruit, accrescent after anthesis mainly in width, 1.4–1.7 cm long, sharply angular in cross-section; teeth unequal (upper ones broader), 1/4 as long as tube, narrowed to sharp point. Corolla 2.5–3.5 cm long, usually blue. Capsule filling up calyx to teeth, broad-oblong.

In damp places.—*Soviet Far East*: Sakhalin (Kuril Islands—Merck and Rudolf according to Georgi, l.c.). *General distribution*: North America. Described from North America. Type in London.

Section 2. *Simiolus* Greene in Bull. Calif. Acad. Sci. (1885) 109.—Annual or perennial plants, glabrous or pubescent. Calyx in fruit inflated, loosely surrounding the membranous capsule; teeth unequal, lower tooth bent over lateral teeth, partly or entirely covering its mouth. Corolla distinctly bilabiate with two umbos, almost covering its mouth. Stamens and style included. Capsule dehiscent up to base along both sutures. Placental column entire.

2. *M. guttatus* DC. Cat. hort. Monsp. (1813) 127; Fischer, Hort. Gorenk. (1812) 25, nom. nud.; Grant in Ann. Miss. Bot. Gard. 157; Maevsk. Fl. ed. 7-e, 157.—*M. luteus* Benth. in DC. Prodr. X (1846) 370, p.p. and auct. plur. Fl. Ross. non L.—*lc.*: Britt. and Brown, Illustr. fl. N. Amer. III, 158, f. 3267; Grant, l.c. tab. VIII, f. 4; Syreistsch. Ill. fl. Mosk. gub. III, 137 (sub *M. luteo* L.); Hegi, Illustr. Fl. Mittel-Eur. VI, 237, f. 1.

Perennial. Stem ascending, somewhat geniculate or erect, pubescent  
 313 only in upper part, elsewhere glabrous, fistular, rather thick (5 mm

broad when compressed), cylindrical, slightly 4-angled above, base often stoloniferous rooting from lower nodes, simple or branched, generally tall (up to 0.5–0.8 m), rarely short. Leaves variable in shape and size, usually large, broadly ovate, orbicular-ovate or oblong-ovate, up to 8 cm long, 5 cm broad, somewhat irregularly dentate, obtuse, uppermost short-acuminate, palmately 7-veined, veins arcuate, converging toward apex, middle and upper leaves with rounded or cordate base, upper (floral) sessile, smaller; middle leaves with short, lower with longer petioles and sometimes with cuneate base; internodes usually longer than leaves. Flowers on stem usually many (up to 10 or more), rarely 1–2, yellow, large, 2.5–3.5 cm long. Calyx puberulent or glabrous, campanulate, about 1 cm long in flower; ovate in fruit, inflated accrescent (up to 1.9 cm long), teeth short- and broad-triangular, unequal, with posterior tooth much longer than others. Corolla usually with red spot in throat, much longer (almost double) than calyx, umbos of lower lip almost closing mouth of tube; style glabrous. Capsule obovoid, not filling up calyx, almost half as long as latter. July.

Sometimes grown as ornamental plant. On river banks, near streams and ditches.—*European USSR*: Baltic Region (Estonia and Latvia), Ladoga-Ilmen, Upper Volga, Volga-Kama. *General distribution*: native of North America, introduced in Europe (northwestern part of USSR, Germany, Austria, Switzerland) and New Zealand. Described from a cultivated specimen. Type in Geneva.

3. *M. pilosiusculus* H.B.K. Nov. gen. and sp. 2 (1817) 397; Benth. in DC. Prodr. X, 371; Grant in Ann. Miss. Bot. Gard. II, 187.

Annual. Plant short, 5–15 cm tall, puberulent or subglabrous. Stem procumbent (at base). Leaves small, short-petiolate, ovate, 16–18 mm long, 6–12 mm broad, acute or obtuse, irregularly dentate; upper leaves sessile (or short-petiolate). Flowers numerous, small, on slender pedicels, generally shorter than bracts. Calyx about 5 mm long, ovate in fruit, inflated, accrescent up to 10 mm long, narrowed at mouth, teeth unequal with posterior tooth longer, acute, straight, anterior teeth incurved and appressed to posterior tooth. Corolla (according to Grant) about 1 cm long, yellow. Capsule filling up calyx.

*European USSR*: Baltic Region (Latvia-Berro), escape. *General distribution*: South America (Peru, Chile). Described from South America. Type in Berlin.

*Note*. The herbarium of Botanical Institute of Akad. Nauk SSSR has  
314 only one poor specimen of this species, collected by Klinge, with the label "Mimulus Parviflorus, near Berro, wild, collected by H. Hür." It is very similar to *M. pilosiusculus* H. B. K. described by Grant in her monograph on the genus *Mimulus*. The presence of this species in the USSR is, therefore, doubtful.



Section 3. *Paradanthus* Grant in Ann. Miss. Bot. Gard. II (1924) 195.—Annual or perennial herbs, glabrous or glandular-pubescent. Calyx campanulate, sometimes inflated in fruit, teeth similar or almost so. Corolla mostly infundibuliform, sometimes bilabiate, generally with broad throat, lobes equal or not, pink, reddish purple, yellow or blue, rarely white. Stamens generally included. Capsule dehiscent up to base; placentae entirely confluent or parted at apex, sometimes up to middle.

4. *M. tenellus* Bge. Enum. pl. Chinae bor. (1831) 49.—*M. nepalensis* Grant in Ann. Miss. Bot. Gard. 206, p.p. quoad specimina chinensia, non Benth.—*lc.*: Komarov, Fl. Man'chzh. III, 417, plate V, figs. 9–11.

Perennial. Plant entirely glabrous. Stem slender, 4–15(22) cm long, rooting at base (creeping, partially ascending), branched from base, with regularly spaced branches. Leaves rather small, petiolate, ovate, short-acuminate or subobtusate, with rounded or cordate base, 6–25 mm long (excluding petiole), 5–15 mm broad, sharply toothed, rarely subdentate, with 4–5 teeth on each side, thin, delicate; petioles  $1/3$ – $1/2$  as long as lamina, sometimes almost as long. Flowers yellow, small, rather numerous, about 1 cm long, pedicels not exceeding petioles. Calyx 5–6 mm long, broad, inflated in fruit, accrescent, 8–9 mm long, 6 mm broad (in herbarium), margin almost straight, with 5 short, fine teeth about 1 mm long, with broad sinuses in between. Corolla about 10 mm long, with broad limb, tube exerted from calyx.

*Soviet Far East*: Ussuri. *General distribution*: North China, Northeast China. Described from Northeast China. Type in Paris.

5. *M. stolonifer* Novopokr. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR XI (1949) 155.—*lc.*: l.c. 157.

Annual. Stem 7–35 cm tall, distinctly hairy (especially in upper part), rather slender, about 1.5 mm thick in middle part, with creeping, slender, flagellate stolons at base, rooting at nodes, with highly reduced opposite leaves separated by long internodes. Leaves puberulent along veins, 315 ovate-rhombic to oblong-rhombic, acute, with short, slightly winged petioles, in middle leaves about  $1/5$  as long as the lamina, sharply dentate in middle and above, with 4–6 teeth on each side, pinnately veined (lateral veins diverging from midrib in lower part of leaf); lamina of middle leaves 1.5–6 cm long, 0.8–2 cm broad; leaves in 3–7 pairs, lower 1–2 of them sometimes with rather slender spaced branches in axils and somewhat reduced leaves; pedicels slender and rather long, shorter, equaling or slightly longer than leaves. Flowers yellow, few (1–3 on main stem), rather large, 2.5–3.5 cm long. Corolla tube narrow below, campanulately broadened upward at level of calyx throat, lobes short, orbicular. Style glabrous; both style and stamens included. August.



*Soviet Far East*: Ussuri (Gulf of Nakhtau, Nelka Bay, Cape of Olympiad). Endemic. Described from Gulf of Nakhtau. Type in Leningrad.

*Note*. Distinguished from the related *M. nepalensis* Benth. by the more or less fibrous (and not glabrous) stems, and the fewer, larger flowers. *M. sessilifolius* Maxim. which is similar to it, is distinguished from our species by its height, glabrous (or subglabrous) stem and sessile, longer and broader (broadly ovate) leaves.

6. *M. moschatus* Dougl.-Lindl. in Edwards and al. Bot. Reg. XIII (1827) 118; Benth. in DC. Prodr. X, 372; Melan-Cajander, Suomen Kasvio, 261; Grant in Ann. Miss. Bot. Gard. 223.—*lc.*: Edwards, l.c.; Britt. and Brown, Illustr. fl. ed. 2, III, 191.

Perennial. Plant glandular-villous (after drying up, glandular heads can only be seen through a powerful lens), emitting (especially in hot weather) a musky fragrance. Stem 5–30 cm tall, cylindrical, procumbent, rooting from lower nodes or almost erect. Leaves ovate, short-petiolate, remote-dentate, sometimes subentire, with usually rounded or truncate, rarely cordate base. Flowers few, 1.5–2 cm long, on slender pedicels, shorter than bracts. Calyx tubular or tubular-campanulate, 8–10 mm long, with unequal (upper longer) subulate-lanceolate teeth,  $1/2$ – $2/3$  as long as tube. Corolla yellow, with reddish veins, pilose at mouth, tube exserted from calyx; limb short, lobes short, almost equal. July.

Near water, along streams, ditches etc. Sometimes cultivated.—*European USSR*: Baltic Region (Tallin), Ladoga-Ilmen (Zelenogorsk). *General distribution*: North America; introduced in Europe. Described from North America. Type in London.

316

### Genus 1334. MAZUS<sup>1, 2</sup> Lour.

Lour. Fl. Cochinch. (1790) 385.—*Hornemannia* Willd. Enum pl. hort. Berol. (1809) 653.

Flowers small, in terminal, almost unilateral racemes. Bracts very minute; bracteoles minute, 1–2 or absent. Calyx broadly campanulate, 5-partite. Corolla pale blue, bluish violet or white, tube short, with bilabiate limb; upper lip slightly arcuate, ovate, short-bifid; lower lip slightly longer, spreading, trifid, with two hollow umbos extended into folds, covered with stipiform papillae at mouth. Stamens four, didynamous, lower stamens longer than upper; anther sacs divaricate. Style terminating in two ovate lobes. Capsule bilocular or 2-valved, dehiscing by longitudinal slits, passing through valves in middle of each loculus; placenta thick, fleshy.

<sup>1</sup> Treatment by V.F. Golubkova.

<sup>2</sup> From the Greek mazos—papillae, since the lower lip is covered with papillae at the mouth.

Seeds numerous, very minute, ovoid. Short annual or biennial herbs, often with underground trailing shoots, pubescent or glabrous. Leaves incisedentate; lower leaves and leaves on shoots opposite or in rosettes, upper usually alternate.

The genus includes nearly 40 species, most of which are found in Central and East Asia and some in India, Indonesia and Australia.

1. Pedicels 7–10 mm long; corolla 6–10 mm long; plant 3–15 cm tall  
..... 1. *M. japonicus* (Thnb.). Ktze.  
+ Pedicels 2–6 mm long; corolla 13–18 mm long; plant 10–40 cm tall  
..... 2. *M. stachydifolius* (Turcz.) Maxim.

1. *M. japonicus* (Thnb.) O. Ktze. Rev. gen. pl. II (1981) 462; Kom. and Alis. Opred. rast. Dalnevost. kr. II, 919.—*M. rugosus* Lour. Fl. Cochinch. (1790) 385; Boiss. Fl. or. IV, 424; Maxim. Prim. Fl. Amur. 205; Kom. Fl. Manchzh. III, 419.—*M. vandellioides* Hance ex Hemsley in Walp. Ann. III (1852–1853) 193.—*Lindernia japonica* Thunb. Fl. Japon. (1784) 253.—*Hornemannia bicolor* Willd. Enum. pl. hort. Berol. (1809) 654.—*Tittmannia obovata* Bge. Enum. pl. Chinae bor. (1833) 49.—*Vandellia obovata* Walp. Rep. III (1844–1845) 294.—*Id.*: Bonati in Lecomte Fl. Gén. Indo-Chine, IV, 349.

- Annual. Stems longitudinally rugose-ribbed, simple erect, 3–15 cm tall, or branched at root neck itself with rather numerous, spreading divaricate, trailing or partially ascending branches up to 30 cm long, sparsely leafy, erect or flexuous, often with shoots, patently pilose or rarely glabrous. Leaves obovate or oblong-cuneate, obtuse, coarsely incisedentate, with 2–5 obtuse teeth on each side or upper leaves mostly obscurely dentate to subentire, sparsely pilose on both surfaces, rarely glabrous; radical leaves 2–4 cm long, 0.8–1.3 cm broad, rosette forming; petiole equaling lamina, sometimes rather broad and winged, sparsely pilose or rarely glabrous; upper leaves opposite or sometimes even alternate, 0.8–2 cm long, 0.2–0.4 cm broad, subsessile or sessile, base cuneate. Flowers in lax, flexuous 3–10(15) cm long racemes; pedicels 7–10 cm long (in flowers), glandular-pubescent, with setaceous, about 1 mm long bract at base. Calyx in flowers 3.5–7 mm long, campanulate, incised up to 1/2 its length or slightly more into broadly lanceolate lobes, accrescent in fruit up to 10 mm long and spherically inflated, with recurved lobes and distinct veins, glabrous outside, rarely with scattered, patent or oblique-antrorse hairs. Corolla bluish violet with yellow patch in throat, 6–10 mm long; limb half as long as tube, middle lobe of lower lip longer than lateral lobes, upper lip finely dotted, tuberculate-villous outside, especially along margin, lower lip covered with stalked papillae inside throat. Stamens situated under upper corolla lip; posterior stamens slightly exceeding

or equaling corolla tube, anterior shorter, filaments united with corolla tube for most of their length; both anthers and filaments glabrous. Style glabrous, slightly shorter than upper corolla lip, curved at apex; stigma lobes unequal, finely asperate-villous along margin. Capsule 3–5 mm long, enclosed in calyx, equaling its tube, compressed, globose, beaked, finely asperate above. Seeds about 0.75 mm long, slightly angular, margin narrow-dentate along angles. July to September.

Silty and sandy river banks, damp places on mountain grasslands and slopes, in deciduous forests and neglected pastures.—*Soviet Central Asia*: Pamiro-Alai (Kashkadarya basin); *Soviet Far East*: Zeya-Bureya, Ussuri. *General distribution*: Japan, China, Tibet. Described from Japan. Type in Uppsala.

2. *M. stachydifolius* (Turcz.) Maxim. in Bull. Acad. Pétersb. XX (1875) 438; Kom. Fl. Man'chzh. III, 418; Kom. and Alis. Opred. rast. Dalnevost. kr. II, 919.—*Tittmannia stachydifolia* Turcz. in Bull. Soc. Nat. Mosc. X (1837) 156.—*Vandellia stachydifolia* Walp. Rep. III (1844–1845) 294.

318 Annual. Stems 10–40 cm tall, erect, simple or with appressed branches in lower part, covered somewhat densely with multicellular patent white hairs intermixed with subsessile glands mainly in upper part, often reddish below. Leaves 1.2–7 cm long, 0.3–2 cm broad, oblong or oblong-lanceolate, irregularly serrate-dentate or subentire; lowermost opposite, narrowed into short and broad petiole; upper leaves subopposite or sometimes the uppermost alternate, subsessile or sessile, narrowed at base, upper surface of all leaves covered with scattered white, fine hairs, lower surface so only along midrib; rarely both surfaces glabrous; racemes narrow and lax usually long, rarely short, (2)4–20 cm long; pedicels shorter than calyx, 2–6 mm long, pilose and asperate-glandular, with a deltoid-lanceolate bract at base, about 1 mm long, ciliate or glabrous along margin. Calyx 4–7 mm long, accrescent up to 10 mm with 10 patently hairy veins, conical, incised up to middle into 5 acute large lanceolate teeth with asperate margin, diffusely glandular all over surface. Corolla 13–18 mm long, with violet tube, slightly exceeding calyx, as long as limb, upper lip 2–3 mm long, narrow, whitish, long tapering at apex up to 1 mm broad and shortly bicornuate, very shortly asperate along margin, lower lip much longer, 6–8 mm long, up to 1 cm broad, bluish-violet, middle lobe shallowly sinuate 1/2 as long as truncate lateral lobes and smaller, with two longitudinal hollow umbos with yellow patch and dense papillose hairs in throat, very finely asperate mainly along margin. Anterior stamens slightly exceeding corolla tube, posterior shorter; filaments united with corolla tube for most of their length, glabrous. Style slightly shorter than upper corolla lip, equaling anterior stamens; stigma lobes very shortly



fimbriate-asperate along margin. Capsule enclosed within calyx, 2–3.5 mm long, globose, slightly compressed, with persistent style, slightly exserted from calyx, densely pilose outside. Seeds up to 0.25 mm long, angular, almost smooth, May to June.

In meadows, pastures, river valleys.—*Soviet Far East*: Zeya-Bureya, Ussuri. *General distribution*: Mongolia, China, Korea, Tibet. Described from North China. Type in Leningrad.

### Genus 1335. *DODARTIA*<sup>1, 2</sup> L.

L. Sp. pl. (1753) 633

- 319 Calyx campanulate, persistent, shortly 5-toothed. Corolla tube long, gradually broadened, limb bilabiate; upper lip short, erect, concave; lower lip larger, elongated, cuneate-obovate, spreading, shortly 3-lobed lobes unequal. Stamens 4, inserted in corolla throat, with equal bilocular anthers. Pistil one, with bilocular ovary, filiform style and bilobed stigma. Capsule globose, nondehiscent. Seeds small, numerous. Flowers numerous, on short pedicels, in sparse racemose inflorescence. Perennial herbs. Monotypic genus.

1. *O. orientalis* L. Sp. pl. (1753) 633; Bge. in Ldb. Fl. alt. II, 449; Benth in DC. Prodr. X, 376; M.B. Fl. taur.-cauc. II, 84; Ldb. Fl. Ross. III, 224; Boiss. Fl. or. IV, 424; Schmalh. Fl. II, 267; O. and B. Fedtsch. Perech. rast. Turkest. 5, 89; Fedtsch. Rast. Turkest. 694; Grossh. Fl. Kavk. III, 380; Kryl. Fl. Zap. Sib. X, 2430.— *Ic.*: Bot. Mag. XLVIII, tab. 2199; Jaub and Spach, Illustr. pl. or. V, tab. 410; Fedtsch. and Fler. Fl. Evrop. Ross. fig. 797; Sorn. rast. SSSR, IV, Fig. 413.— *Exs.*: Ed. Hort. Bot. Petrop. No. 47; GRF, No. 1178; HFAM, No. 156.

Perennial. Plant 15–50 cm tall, glabrous, sometimes puberulent in lower part. Root thick, vertical, elongated. Stems solitary or almost fasciculate, erect, somewhat cylindrical, branched from base; branches slender, flexuous, lower mostly opposite, upper alternate, equal in length, rarely leafy. Lower leaves opposite, ovate or oblong, broad at base, 1.5–4.5 cm long, 3–5 mm broad, acute, other leaves alternate, linear-lanceolate or linear, 1 cm long, 1 mm broad, acute; upper leaves 0.5 cm long, 1 mm broad, scaly, almost linear, obtuse, all leaves flat, sessile single-veined, generally entire or sometimes regularly dentate. flowers on short, 0.5–1 mm long, erect, thick, glabrous pedicels, regularly spaced, 3–7 in terminal, simple, erect, 3.5–11 cm long, 1–2.5 cm broad, leafless racemes. Bracts 1.5–5 mm long, 0.5–1.7 mm broad, oblong-lanceolate or ovate, subacute.

<sup>1</sup> Treatment by S.G. Gorschkova.

<sup>2</sup> Named after the French doctor and botanist Dionis Dodart (1624–1707).



Calyx 3.5 mm long, 1/5–1/4 as long as corolla, 10-veined, glabrous with deltoid, acute, erect, 1 mm long, subequal teeth. Corolla dark purple or dark violet, 1.5–2.5 cm long, very rarely white (f. *alba* Trautv.), turning black on drying, with almost open throat, finely glandular outside or glabrous, with clavate, erect tube and bilabiate limb; upper lip short, erect, ovate or oblong, sharply incised, bilobed, lobes ovate, subacute, lower lip 2–3 times as long as upper lip, convex, 3-lobed; lateral lobes orbicular, middle ovate-oblong, obtuse, with two longitudinal tubercles in the middle, densely covered with long, flat, white glands with rounded black ends (clavate hairs). Two stamens almost equaling corolla tube and two longer, 320 exerted, slightly shorter than upper lip; filaments glabrous; anthers violet, glabrous, reniform. Ovary globose, 1.5 mm long, 1.3 mm broad, glabrous; style 1.3 cm long, glabrous, erect, 6–7 times as long as ovary, exerted, with bilobed stigma, lobes flat, slender, oblong or ovate, equal, obtuse, with lanate surface. Capsule cartilaginous, bilocular, obscurely 4-ribbed, smooth, 5 mm long, light or dark brown, somewhat depressed above, with a small mucro. Seeds ovoid or more or less trigonous, 0.5–0.7 mm long, 0.3 mm broad, yellowish brown, smooth. May to July.

In steppes, on stony slopes and sands, alkaline, salt marshes and steppe meadows and along river valleys. As a weed among crops of oats, wheat, barley, rice, near gardens and roads.—*European USSR*: Middle Dnieper (Vapnyarka escape), Trans-Volga Region, Black Sea Region, Lower Don, Lower Volga; *Caucasus*: Ciscaucasia, Dagestan, western, eastern and southern Transcaucasia; *Western Siberia*: Upper Tobol, Irtysh, Altai; *Soviet Central Asia*: Aral-Caspian Region, Balkhash Region, Dzh.-Tarbagatai, Kyzyl Kum, Kara Kum, mountainous Turkmenia, Amu Darya, Syr Darya, Pamiro-Alai, Tien Shan. *General distribution*: Iran. Dzh.- Kashgar (Kuldzha),

Mongolia (northwest). Described from Ararat. Type in London.

*Economic importance*: In autumn, the lower part of the plant produces a white resinous sap, used by the Kirghiz people for making sulfur for chewing (Ivanov, 1913, in herbarium). The plant is a new source of medicinal raw material and has been tried as laxative [S.E. Zemlinsky, *Medicinal Plants of USSR* (1949) 277].

### Genus 1336. *DOPATRIUM*<sup>1, 2</sup> Hamilt.

Hamilt. in Benth. *Scroph. ind.* (1835) 30

Flowers solitary, axillary. Calyx short, 5-partite. Corolla infundibuliform, with long, narrow-cylindrical tube broadening at mouth and bilabiate

<sup>1</sup> Leaves by S.G. Gorschkova.

<sup>2</sup> East Indian name.

limb, upper lip short, almost bilobed, lower lip larger, broadly 3-lobed. Stamens 2, included, and staminodes 2, all inserted in corolla tube. Pistil one with globose ovary, short style and bilobed stigma. Capsule sulcate, dehiscing by 4 valves. Seeds numerous, minute, tuberculate. Marsh annuals, glabrous plants with opposite entire leaves.

Seven species, distributed in Africa and tropical Asia. One species occurs in USSR.

1. *D. junceum* (Roxb.) Hamilt. in Benth. Scroph. ind. (1835) 31; Benth in DC. Prodr. X, 407; Fedtsch. Rast. Turkest. 694.—*Gratiola juncea* 321 Roxb. Pl. Corom. II (1798) 16.—*Ic.*: Roxb. l.c. tab. 129; Sorn. rast. SSSR, IV, fig. 414; Somoku-Dzusetsu, ed. Makino (Iconogr. pl. Nippon) I, tab. 41.

Annual. Plant 10–30 cm tall, glabrous, with numerous slender roots. Stem erect, rounded, ascending, sparingly branched at base. Leaves oblong or obovate, 1–2.5 cm long, 0.4–0.6 cm broad, subacute, upper leaves 0.8 cm long, 0.4 cm broad, broadly ovate, subobtusate, all leaves sessile, somewhat transparent, shining. Flowers small, solitary, usually on 4–8 mm long, filiform, glabrous pedicels, in upper leaf axils and on branch ends, lower flowers generally on 2 mm long pedicels. Calyx 1–1.5 mm long, teeth subobtusate, 0.5–0.7 mm long, 1/2 as long as calyx. Corolla pinkish lilac, 4–5(6) mm long, upper lip bilobed, 1 mm long; lobes oblong, obtuse, equal, 0.5 mm long, 0.5 mm broad; lower lip 2 mm long, 2–3 times as long as upper lip, 3-lobed, lobes unequal, middle lobe 1 mm long, 0.8 mm broad, oblong, obtuse, lateral lobes 0.8 mm long, 1 mm broad. Stamens 2, posterior, fertile, with short glabrous filaments and globose, converging, yellowish brown anthers; staminodes 2, filiform. Ovary globose, 1 mm long, 0.8 mm broad, yellowish brown, smooth; style reduced, thick, slightly shorter than ovary, with bilobed stigma. Capsule ellipsoid or sometimes subglobose, 2 mm long, 1.5 mm broad, dark brown or yellowish brown, obtuse. Seeds 0.3 mm long, 0.1 mm broad, oblong-ellipsoid, yellowish brown, finely tuberculate. July to August.

In rice fields.—*Soviet Central Asia*: Amu Darya, Pamiro-Alai. *General distribution*: India-Himalayas, Japan, China, Australia. Described from India. Type in London.

### Genus 1337. *GRATIOLA*<sup>1, 2</sup> L.

L. Sp. pl. (1753) 17

Flower solitary, axillary on long pedicels or subsessile. Calyx 5-partite almost up to base. Corolla white, yellowish or pinkish, with long

<sup>1</sup> Treatment by S.G. Gorschkova.

<sup>2</sup> Diminutive from Latin *gratia*—grace, from the curative property of the plant.

tube and short, obscurely bilabiate limb, upper lip entire or somewhat sinuate, lower lip 3-lobed. Stamens 4, anterior two with long and slender filaments and underdeveloped anthers, inserted almost at base of corolla tube, two posterior with thick, rather short filaments, inserted in middle part of tube, anthers bilocular, with parallel sacs, obliquely situated on broad, somewhat scarious, patelliform connective. Pistil one; ovary ovoid, style long, curved above with bilobed stigma. Fruit a capsule, broad-ovoid or globose, dehiscent by 4 valves. Seeds numerous, minute, oblong, somewhat fusiform longitudinally reticulate-sulcate, somewhat curved.

The genus includes 24 species distributed in subtropical countries nearly all over the globe.

1. Plant perennial, 20–60(80) cm tall, with thick, creeping rootstock; leaves lanceolate, dentate in upper part; flowers on long, 1.5–2 cm long pedicels; corolla 1.8–2 cm long, 3 times as long as calyx .....

..... 1. *G. officinalis* L.

+ Plant annual, 8–20 cm tall, with numerous slender roots in thick cluster; leaves oblong or lanceolate, entire; flowers subsessile; corolla 5–6 mm long, 1.5 times as long as calyx ..... 2. *G. japonica* Miq.

1. *G. officinalis* L. Sp. pl. (1753) 17; Bge. in Ldb. Fl. alt. I, 46; Benth. in DC. Prodr. X, 404; Ldb. Fl. Ross. III, 224; Schmalh. Fl. II, 268; Grossh. Fl. Kavk. III, 380; Kryl. Fl. Zap. Sib. X, 2431.—*Inc.*: Syreistsch. III. fl. Mosk. gub. III, 138; Kom. Sb., sushka i razv. lek. rast. Ross. ed. 3, fig. 44; Maevisk. Fl. ed. 8, fig. 175; Hegi, Illustr. Fl. Mittel-Eur. VI, 1, tab. 237, f. 2, 2a,—*Exs.*: GRF, No. 329; Fl. pol. exs. No. 468; Fl. Hung. exs. No. 452; Fl. exs. Reipubl. Boh.-Slov. No. 1267; Herb. norm. No. 4910; Fl. exs. austro-hung. No. 2929.

Perennial. Plant 20–60(80) cm tall, glabrous, with creeping, rather thick, 4–5 mm broad, articulate, brown rootstock, covered with small scales. Stem erect, mostly reddish-violet at base, 4-angled above, simple, sometimes branched. Leaves opposite, sessile, semiamplexicaul, lanceolate, (1.5)3–5(6) cm long, (0.2)0.5–1(1.3) cm broad, acute, mostly 3-veined, dentate or sharp-serrulate in upper part, entire below, surface sparsely and minutely glandular-punctate. Flowers on slender, 1.5–2 cm long pedicels, solitary, axillary, subtending leaf half as long as pedicel; bracteoles 2 at calyx base, linear, 1–1.2 cm long, 1 mm broad, slightly longer, acute, single-veined, sometimes sparsely glandular-punctate. Calyx 5-partite almost to base, 7–7.5(8) mm long, 1/3–2/5 as long as corolla; lobes lanceolate-linear, (6)6.5–7(7.5) mm long, 0.7 mm broad, long acuminate, sparsely glandular-punctate. Corolla 1.8–2 cm long, broadened above up to 4–5 mm, tube yellowish, 1.3 cm long, 2–3 mm broad, with sparse, longitudinal, dark violet veins, similar to the white, almost bilabiate limb;



upper lip trapezoidal, rather narrowed at base, 6–6.5 mm long, 8.5 mm broad, entire or somewhat sinuate; lower lip 3-lobed, lobes equal, obovate, 6.5 mm long, 7 mm broad, obtuse, entire; upper part of corolla tube and base of lateral lobes covered on inner side by whitish yellow, long, unicellular, simple and sparse, claviform hairs. Filaments of two anterior stamens 5–5.5 mm long, with slender undeveloped anthers, posterior stamens with broader 2 mm long filaments and transversely inserted anthers. Pistil with ovoid, 2–2.5 mm long, 2 mm broad ovary, 6–6.5 mm long style; stigma bilobed, 0.7 mm long, ligulate. Capsule broadly ovoid, 5–6 mm long, 7 mm broad, smooth, dark yellowish brown, acute, almost equaling calyx or a little shorter. Seeds numerous, 0.5–0.8 mm long, 0.2–0.3 mm broad, oblong, almost trigonous, mostly obliquely truncate above, narrow underneath, straight or sometimes somewhat curved, brown or cinnamon, longitudinally and transversely sulcate, reticulate-rugose. June to October.

On hummocks, banks of ponds, flood meadows, coastal sands and as a weed in rice fields. *European USSR*: Baltic States, Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Trans-Volga Region, Bessarabia, Black Sea Region, Crimea, Lower Don, Lower Volga; *Caucasus*: Ciscaucasia, western and eastern Transcaucasia; *Western Siberia*: Irtysh, Altai; *Soviet Central Asia*: Aral-Caspian Region, Balkhash Region, Syr Darya, Pamiro-Alai (vicinity of the city of Stalinabad), Tien Shan (Alma-Ata Region). *General distribution*: Central and Atlantic Europe, Mediterranean Region, Balkan States-Asia Minor, Iran, North America. Described from Europe. Type in London.

*Economic importance*: All parts of the plant are poisonous, containing glucosides grasiolin and grasiolysin, which act as a strong purgative, the property persisting even on drying. Gratiola, if mixed with hay, causes severe diarrhea in animals, resulting in complete exhaustion and even death (N.V. Pavlov, Rast. res. yuzhn. Kazakhst. (1947) 188). Medicinal plant, used as a home remedy.

2. *G. japonica* Miq. in Ann. Mus. Bot. Lugd.-Bat. II (1865–1866) 117; Kom. Fl. Man'chzh. III, 421; Kom. and Alis. Opred. rast. Dalnevost. kr. II, 919.—*lc.*: Kom. l.c. Plate V, 12.

Annual. Plant glabrous, roots numerous, slender, fibrous, in dense cluster. Stem 8–20 cm tall, decumbent and rooting at base, ascending, erect, simple, weakly branched, somewhat thickened, succulent. Leaves oblong or lanceolate, 0.7–2.3 cm long, 2.5–6 mm broad, sometimes elongate, subacute, smooth, somewhat fleshy, entire, petiolate. Flowers sessile, solitary, axillary; bracteoles herbaceous, linear-lanceolate, 4–4.5 mm long, 0.5–0.7 mm broad, subobtuse. Calyx pale, 5-partite almost to base, 3–4 mm long; lobes linear- or oblong-lanceolate, 2–2.5 mm long, 1 mm broad, subobtuse, with thin scarious margin. Corolla 5–6 mm long,



- 324 1.5–2 mm broad, white or yellowish; tube 4–4.5 mm long, short-bilabiate; upper lip 1–1.5 mm long, 1.5 mm broad, trapezoidal, obtuse or lightly sinuate; lower lip 3-lobed, lobes obovate, 0.8–1.3 mm long, 0.7 mm broad, obtuse, generally somewhat sinuate above. Two stamens fertile, with 0.6 mm long filaments and broadly ellipsoid anthers with parallel sacs, other two stamens sterile (staminodes), with filiform, somewhat elongated filaments terminating in capitate underdeveloped anthers above. Pistil with ovoid ovary 1.5–2 mm long, 1.2–2 mm broad; style 1.2–1.8 mm long; stigma suborbicular bilobed. Capsule ovoid or globose, compressed, 4 mm long, 4.5 mm broad, slightly exceeding or sometimes almost equaling calyx, smooth, yellowish brown, thin-walled. Seeds numerous, 0.7 mm long, 0.2 mm broad, somewhat curved, yellowish brown, longitudinally reticulate-sulcate. June to July.

Silty and sandy shoals near lakes, ox bows, canal and rivulets. —*Soviet Far East*: Zeya-Bureya, Ussuri. *General distribution*: Japan and China (Manchuria). Described from Japan. Type in Tokyo.

### Genus 1338. *LIMOSELLA*<sup>1, 2</sup> L.

L. Sp. pl. (1753) 631

Flowers small, solitary, axillary, on short pedicels. Calyx campanulate, 5-toothed. Corolla rotate-campanulate, almost regular; tube short; limb 5-lobed, open, almost bilabiate. Stamens 4, equal, inserted in middle of tube, anthers unilocular. Pistil with oblique, more or less short style. Capsule 2-valved, bilocular only at the base. Seeds numerous, minute, oblong. Herbs, glabrous, sodden or procumbent.

Of 7 species in this genus, distributed almost all over the globe, one occurs in the USSR.

1. *L. aquatica* L. Sp. pl. (1753) 631; Bge. in Ldb. Fl. alt. II, 463; Turcz. Fl. baic-dah. II, 335; Benth. in DC. Prodr. X, 426; Ldb. Fl. Ross. III, 226; Boiss. Fl. or. IV, 428; Schmalh. Fl. II, 269; Kom. Fl. Man'chzh. III, 423; Kom. Fl. Kamch. III, 64; O. and B. Fedtsch. Perech. rast. Turkest. 5, 90; Fedtsch. Rast. Turkest. 694; Kom and Alis. Opred. rast. Dalnevost. kr. II, 920; Grossh. Fl. Kavk. III, 381; Kryl. Fl. Zap. Sib. X, 2432.— *Ic.*: Lam. Illustr. III, tab. 535; Rchb. Ic. fl. Germ. XX, tab. 1722; Fedtsch. and  
325 Fler. Fl. Evrop. Ross. fig. 799; Syreistsch. Ill. fl. Mosk. gub. III, 139; Hegi, Illustr. Fl. Mittel-Eur. VI, 1, tab. 237; Fl. Yugo-Vost. fig. 631.— *Exs.*: Fl. Finl. exs. No. 346 and 910; Herb. Fl. Ingr. No. 454; GRF, No. 222; Fl. Hung. exs. No. 776; Fl. exs. austro-hung. No. 2618.

<sup>1</sup> Treatment by S.G. Gorschkova.

<sup>2</sup> From the Latin *limosus*—limy, indicating habitat of the plant.

Annual. Plant 3–5(10) cm tall, glabrous, with trailing, slender, rooting branches. Leaves in basal rosettes and terminating shoots, elliptical or linear (var. *tenuifolia* Lej.), linear-oblong or linear-spatulate, 0.3–1.5 cm long, 0.5–5 mm broad, subobtusate, entire, somewhat fleshy, at least 1/3 as long as 0.7–4 cm long petiole. Flowers (3–10) solitary axillary, on erect 0.7–1.3 cm long pedicels; pedicels sometimes equaling leaves (var. *tenuifolia* Lej.), without bracteoles. Calyx 1.5–2 mm long, 0.7 mm broad (accrescent in fruit—2.5 mm long, 1.7 mm broad), shorter than corolla, tube 1–1.5 mm long, 3 times as long as lobes; lobes ovate-triangular, 0.5–0.7 mm long, 0.7 mm broad, acute, reflexed. Corolla white or pink, 2–3.5 mm long, almost regular; tube greenish, 1.6–2 mm long and 0.8 mm broad; lobes 5, elliptical, oblong or oblong-ovate, obtuse, 1–1.2 mm long, 0.5–0.7 mm broad. Stamens 4, sometimes 2 (var. *diandra* (Krock.) Mart.), equal, with dark brown anthers, transversely attached to filaments. Pistil with ovoid, brown ovary 1.3 mm long, 0.7 mm broad, style 0.7 mm long and capitate stigma. Capsule ovoid or globose, 3 mm long, 2 mm broad, slightly exceeding calyx, yellowish brown (or brown), smooth. Seeds 0.5 mm long, 0.2 mm broad, biconvex, ends acuminate, nearly beaked, brown or yellowish brown, longitudinally ribbed, transversely rugulose. April to September.

On sandy and silty banks, shoals, near ditches, in meadows, on bottom of dry ponds, in turfy flood plain meadows.—*Arctic Region*: Arctic Europe, Arctic Siberia (Nikandr island on the Yenisey), Anadyr (Penzhina River Basin); *European USSR*: Karelia-Lapland, Dvina-Pechora, Baltic States, Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Trans-Volga Region, Bessarabia, Black Sea Region, Lower Don, Lower Volga; *Caucasus*: southern and eastern Transcaucasia; *Western Siberia*: Ob (region), Upper Tobol, Irtysh, Altai; *Eastern Siberia*: Yenisei, Lena-Kolyma (Lena Valley below Yakutsk), Angara-Sayan, Dauria; *Far East*: Kamchatka, Okhotsk (Ayan), Zeya-Bureya, Ussuri; *Soviet Central Asia*: Aral-Caspian Region, Pamiro-Alai (Toguzbulak valley near Varsida village, Novobad), Tien Shan (Kizylsu). *General distribution*: Arctic Region, Scandinavia, Central and Atlantic Europe, India-Himalayas, Mongolia, Japan, China (Manchuria), North America, Tibet, South America, Austria, Africa. Described from northern regions of Europe. Type in London.

The following forms can be recognized:

Terrestrial form with rather short petioles and thick blades, the most widely distributed one; and

Aquatic form, with floating leaves, on petioles up to 15 cm long, with thin oblong-elliptical blades.

Genus 1339. *VANDELLIA*<sup>1, 2</sup> L.

L. Mant. I (1767) 89

Calyx tubular or campanulate, 5-toothed or 5-partite, lobes subequal, slightly imbricate. Corolla limb bilabiate, upper lip erect, shortly 2-partite, lower lip larger, diverging, 3-partite. Stamens 4, didynamous, fertile, filaments converging, anterior inserted at base of lower lip, longer, with filiform or toothlike appendages at base, posterior stamens short; anthers convergent, sacs divaricate. Pistil with unilocular ovary, simple style and often bifid or subentire stigma. Capsule globose-oblong or linear, short-beaked, dehiscing by two valves, valves scarious, entire, margin flat separating up to the middle with one placenta. Seeds numerous. Flowers solitary, axillary, opposite, on short or somewhat long pedicels, sometimes in racemes terminating branches, such racemes often in false compressed umbels. Herbaceous plants, often decumbent, branched, glabrous or pubescent. Leaves opposite.

Thirty species distributed in tropical and subtropical countries of Asia, Africa, Australia and America. One occurs in the USSR.

1. *V. diffusa* L. Mant. I (1767) 89; Benth. in DC. Prodr. X, 416; Grossh. Fl. Kavk. III, 381.—*Lindernia diffusa* (L.) Wettst. in Pflanzenfam. IV, 3b (1891) 79.—*lc.*: Lam. Illustr. III, tab. 522; London, Mag. Nat. Hist. I, 189; Trans. Med. Bot. Soc. London, tab. 1; Martius, Fl. Brasil. VIII, I, tab. 55.

Annual. Plant diffusely setose, often canescent, 5–20 cm tall, with slender branched roots. Stems almost filiform, 4-angled, decumbent or ascending, erect, branched, branches divaricate. Leaves ovate or broadly ovate, (0.3)0.7–2.5 cm long, (0.1)0.5–2 cm broad, subacute, almost coriaceous, margin sharply serrate or serrate-subdentate, rarely ciliate, green or violet, often yellowish below, opposite, somewhat connivent, rounded at base, sessile or on 1–2 mm long petioles, obscurely 3–5-veined, lower surface (especially along veins) sparsely pubescent. Flowers small, solitary, axillary, on short, erect, angular, pubescent pedicels, equaling or slightly exceeding calyx (*α. pedunculata* Benth.), 1/5–1/2 as long as leaves; bracteoles absent. Calyx tubular-campanulate, almost 327 5-segmented, (2.5)3–4(4.5) mm long, 1.5 mm broad, often thin at base, angular, pubescent; lobes linear-lanceolate, 0.7–2 mm long, 0.2 mm broad, acute, ciliate along margin. Corolla 6 mm long, whitish, tube 4 mm long, limb bilabiate, upper lip longer, erect, ovate, shortly 2-segmented or often entire, obtuse, violet; lower lip larger, deflexed, white, 3-lobed, lobes

<sup>1</sup> Treatment by S.G. Gorschkova.

<sup>2</sup> Named after Vandelli, a professor of botany (in Coimbra), who studied plants of Portugal and Brazil.



orbicular. Two anterior stamens with longer filaments, converging, flattened, curved with appendages at base; appendages tuberculate-glandular, obovate, oblong or subulate, acute; anthers almost connate; two posterior stamens with short filaments. Pistil with oblong-conical ovary 2 mm long, 0.7 mm broad; style 3 mm long, glabrous, arcuate above and bilamellate stigma. Capsule oblong or linear, 8–9 mm long, 3–3.5 mm broad, dull yellow, acute, glabrous, striped, 2-valved, valves scarious, entire. Seeds numerous, 0.5–0.6 mm long, 0.3 mm broad, somewhat angular, yellowish or brownish, longitudinally papillose on surface. June to July.

Weed among crops of rice and maize (escape from tropics). *Caucasus*: western Transcaucasia (Adzharia, Sarpi), eastern Transcaucasia. *General distribution*: America, Africa. Described from America. Type in London.

### Genus 1340. *LINDERNIA*<sup>1, 2</sup> All.

All. Misc. taurin. III (1755) 178

Flowers solitary, axillary, usually on long pedicels, open (chasmogamous) and developing closed (cleistogamous) flowers as well. Calyx deeply 5-partite, lobes almost identical. Corolla tubular, limb bilabiate; upper lip flat, short, slightly sinuate or sometimes bilobed; lower lip more or less diverging, 3-lobed. Stamens 4, anthers free, bilocular, with sacs obliquely diverging. Pistil one, with unilocular ovary, short style and capitate stigma. Capsule ellipsoid-ovoid or oblong-ellipsoid, dehiscing by two valves. Seeds numerous. Herbaceous annual plant, glabrous, with opposite leaves. Monotypic genus.

1. *L. pyxidaria* All. Misc. taurin. III (1755) 178; Benth. in DC. Prodr. X, 418; M.B. Fl. taur.-cauc. II, 81; Ldb. Fl. Ross. III, 225; Kom. Fl. Manchzh. III, 423; Kom and Alis. Opred. rast. Dalnevost. kr. II, 920; Grossh. Fl. Kavk. III, 381; Kryl. Fl. Zap. Sib. X, 2433; Maevsk. Fl. ed. 8, 456.—*Vandellia pyxidaria* Maxim. in Bull. Acad. Pétersb. XX (1875) 449; Boiss. Fl. or. IV, 427; Schmalh. Fl. II, 268.—*V. erecta* Benth. Scroph. ind. (1835) 36.—*Id.*: All. l.c. tab. 5; Lam. Illustr. III, tab. 522; Somoku-Dzusetsu, ed. Makino (Iconogr. pl. Nippon) XI, tab. 67.—*Exs.*: Fl. exs. Reipubl. Boh.-Slov. No. 365; Fl. exs. austro-hung. No. 2123.

Annual. Plant 2–18(25) cm tall, with numerous fibrous roots. Stems 4-angled, slender, decumbent, procumbent or erect, usually branched from

<sup>1</sup> Treatment by S.G. Gorskova.

<sup>2</sup> Named after Frantz Balthazar Lindern (1682–1755), a doctor and botanist in Strasbourg.



base, with somewhat diverging branches. Leaves ovate, oblong-elliptical or elliptical, 0.6–2 cm long, 0.3–0.9 cm broad, opposite, obtuse, 3–5-veined, entire or sometimes denticulate-ciliate along margin, sessile, green or dark violet, generally narrowed at base, semiamplexicaul. Flowers solitary, axillary, on filiform, slender, 1–2(2.5) cm long pedicels; bracteoles absent. Calyx 3–4 mm long, parted almost up to base; lobes linear or lanceolate-linear, subacute, 3.5 mm long, 0.5 mm broad, generally violet above, shortly serrate-ciliate along margin. Corolla of open flowers 7–8 mm long, pale bluish, with violet spots; upper lip 1.4 mm long, 1.2 mm broad; lower lip 3 mm long, 2.5 mm broad, yellowish, 3-lobed; middle lobe 1.8 mm long, 1.5 mm broad and lateral 1 mm long and 0.7 mm broad. Two anterior stamens shorter than posterior, situated under lower lip, their filaments 1.3 mm long, curved, with subulate or linear, glandular, 0.7 mm long appendages at base, rounded above, almost 2 times as broad as filaments. Cleistogamous flowers with closed corolla; corolla slightly shorter than or almost equaling calyx, upper lip pink, slightly shorter than yellowish lower lip. Stamens 4, erect, equal, appendages absent. Pistil with ellipsoid ovary 1.5 mm long, 0.6 mm broad, style 3 mm long and capitate stigma. Capsule oblong-ellipsoid, 3–4 mm long, brownish, smooth, with short spinule at apex, dehiscing by two valves. Seeds 0.2–0.3 mm long, 0.1 mm broad, oblong, obtuse, biconvex, yellowish, oblong-pitted on surface. May to August.

On silty banks, in marshes. As weed sometimes in rice fields.—*European USSR*: Upper Dnieper, Middle Dnieper, Volga-Don, Trans-Volga Region, Black Sea Region, Lower Don (vicinity of the city of Serafimovich), Lower Volga; *Caucasus*: western Transcaucasia (Adzharia), eastern Transcaucasia, Talysh; *Western Siberia*: Irtysh (Ust-Kamenogorsk district; between Ulba and Irtysh), Altai (between Barnaul and Chesnokovka); *Soviet Far East*: Zeya-Bureya, Uda Region (Evura River bank, above Kargaka); *Soviet Central Asia*: Aral-Caspian Region, Balkhash Region (bank of Black Irtysh near the settlement of Buran), Pamiro-Alai. *General distribution*: Central Europe, Mediterranean Region (west), Balkan States—Asia Minor, Iran, India-Himalayas (eastern India) Japan and China. Described from northern Italy (?). Type in Florence.

Subfamily III. RHINANTHNOIDEAE Wettst. in Pflanzenfam. IV, 3b (1985) 82.—Posterior lobes of corolla covered by 1 or both lateral lobes in aestivation.

Tribe 1. *VERONICEAE* Benth. in DC. Prodr. X (1846) 456. Corolla tube very short, its lobes mostly widened. Stamens removed, usually 2. Anthers obtuse, bilocular or unilocular. Fruit—capsule. Leaves, at least basal, opposite.

### Genus 1341. *VERONICA*<sup>1, 2</sup> L.

L. Sp. pl. I (1753) 9.—*Veronicastrum* Heist. ex Fabr. Enum. meth. (1759) 111.—*Diplophyllum* Lehm. in Ges. Naturf. Fr. Berl. Mag. VIII (1814) 310.—*Cochlidiospermum* Rchb. Consp. (1826) 121.—*Pseudolysimachion* Opiz, Seznam (1852) 80.—*Beccabunga* Fourr. in Ann. Soc. Linn. Lyon. N.S. XVII (1869) 129.—*Veronicella* Fourr. l.c. 128.—*Paederotella* (Wulff) Kem.-Nath. in Fl. Gruz. VII (1952) 341, nomen; in Zam. po sist. i geogr. rast. Akad. Nauk GruzSSR 17 (1953) 21.

Calyx usually deeply divided into 4 or 5 lobes, or lobes united in pairs almost to apex. Corolla deep blue, pink or white, sky blue or lilac, rarely yellow, lobes united at base forming short tube or tube 1/2–3/4 as long as corolla, in which case corolla tubular or tubular-campanulate; limb 4(5)-lobed, rotate or bilabiate, with erect or spreading, usually unequal lobes; upper lobe larger than others, entire, rarely sinuate, broader than lateral lobes, lower lobe narrower than lateral lobes. Stamens 2, with somewhat long filaments, shorter or longer than corolla, inserted in corolla tube between upper and lateral lobes; anthers with two parallel sacs, dehiscing by longitudinal slit. Pistil with long style and small capitate stigma. Capsule bilobed, usually compressed perpendicularly to the septum or inflated, often notched, obtuse or acute at apex, with persistent style, glabrous or pubescent with simple or glandular hairs, smooth or reticulate due to prominent veins, dehiscing along two valves, loculicidal or septicidal. Seeds 1–12 in each locule, usually small, rarely rather large (one per locule), orbicular, ovate or oblong, scaphoidally concave or flat, biconvex, rugose or smooth, glabrous, rarely pubescent.

330 Perennial or annual herbs, sometimes small semishrubs with woody base, either with woody or somewhat thick branched or reduced rhizomes, or with numerous slender roots. Leaves opposite, alternate or alternate only above, sometimes in whorls of 3–9, glabrous or pubescent with simple or glandular hairs. Stems erect or procumbent. Flowers crowded in terminal or lateral racemose, spicate, capitate or corymbose inflorescences, or solitary in leaf axils, sessile or on somewhat long pedicels.

Genus type—*Veronica officinalis* L.

Species of the genus *Veronica* (nearly 300) are distributed in all parts of the globe. They are most abundant in Europe and in Asia, mainly in countries adjoining the Mediterranean Sea. In Australia, New Zealand and South America, veronica shrubs are typical as landscape plants. A small number of veronica species (about 11) is known in Africa. North America has nearly 15, related to the Eurasian species.

<sup>1</sup> Treatment by A.G. Borissova.

<sup>2</sup> Name of the plant given by ancient authors.

1. Perennials, rarely annuals in wet habitats (some species of Section *Beccabunga*), in the latter case capsules inflated; capsules compressed laterally or inflated; flowers in axillary or terminal racemose or spicate inflorescences, rarely solitary axillary ..... 2.
- + Annuals, generally small plants with slender roots; capsules compressed laterally or slightly inflated; flowers solitary, axillary or in terminal inflorescences; calyx 4-partite; corolla rotate ..... 8.
2. Flowers in axillary inflorescences or solitary, axillary; stem and branches terminating into leafy shoots; leaves all opposite ..... 3.
- + Flowers in terminal dense or lax racemes, sometimes spicate, inflorescences long or short, sometimes capitate; stem and branches terminating into inflorescences; upper floral leaves opposite or whorled, sometimes alternate ..... 5.
3. Flowers in axillary opposite or solitary inflorescences, often lax; main stem terminating into leaves; corolla rotate, with short tube; calyx 4- or 5-partite; stem without scale, leaves at base ..... 4.
- + Flowers solitary, axillary; corolla tubular-campanulate or tubular, lobes erect, large, not united up to apex, tube short, without hairy ring; calyx 5-partite; stem with scale leaves in lower part. Caucasian plants (Subgenus *Paederotella* (Wulff) Boriss) ..... 46.
- 331 4. Capsule orbicular to oblong-ellipsoid, inflated or slightly compressed, loculicidal or septicidal, obtuse or acute; seeds slightly flattened, ovate or oblong; calyx 4-partite. Plants generally confined to aquatic or marshy habitats, banks of ponds and rivers [Section *Beccabunga* (Griseb.) Benth.] ..... 48.
- + Capsule strongly compressed laterally, septicidal; valves united almost up to apex; seeds compressed, planoconvex or scaphoid, incurved on one side; calyx 4- or 5-partite. Plants not aquatic (Section *Chamaedrys* Griseb.) ..... 103.
5. Corolla with short tube, rotate, sometimes united up to 1/2, with recurved or erect lobes; leaves opposite or whorled ..... 6.
- + Corolla tubular, with long tube, much exceeding calyx, with short limb; leaves alternate, opposite or whorled; capsule acute, not compressed; style 8–9 mm long; calyx 5-partite; inflorescence spicate, long. Large plants of Far East [Subgenus *Veronicastrum* (Heist.) Boriss.] ..... 43.
6. Calyx often 4-partite; corolla tube very short, broader than long, much shorter than limb; upper floral leaves alternate; capsules laterally compressed or suborbicular, slightly compressed, obtuse or emarginate, not tapering at apex; racemes often long, spicate or more or less lax, interrupted and short ..... 7.
- + Calyx 5-partite, sometimes 4-partite; corolla with short tube or connate up to 1/2 its length; capsules not laterally compressed or scarcely



- so, generally somewhat tapering at apex, often longer than broad, exceeding calyx; seeds flat; flowers in terminal, dense, often capitate racemes, racemes elongated in fruit; sometimes lateral racemes also present; stems usually numerous, densely leafy, sometimes with scale leaves at base. High-altitude plants, 5–25(35) cm tall, with creeping, slender rootstock (Section *Macrostemon* Boriss.) ..... 60.
7. Racemes short, if long, then lax and interrupted; corolla rotate, with very short tube; capsule strongly laterally compressed, often emarginate above (Section *Euveronica* Griseb.) ..... 72.
- + Racemes dense, often long, sometimes short, spicate; corolla tube conspicuous, lobes recurved or erect; capsules suborbicular, slightly laterally compressed, obtuse or emarginate. Generally large plants, often widely distributed. (Section *Pseudolysimachia* Koch) ..... 82.
8. Seeds scaphoid, concave above, convex below ..... 9.
- 332 + Seeds flat or biconvex, with more or less distinct hilum ..... 34.
9. Calyx lobes united in pairs almost to apex, calyx thus appearing 2-partite with bifid lobes ..... 10.
- + Calyx lobes free almost to base ..... 12.
10. Cauline leaves whorled, together in fours at inflorescence base or sometimes slightly apart, entire or shallowly dentate; calyx not accrescent in fruit ..... 11.
- + Cauline leaves not whorled, with serrate-dentate margin, conspicuously palmately veined, with cordate base; calyx lobes leafy, united in pairs almost up to apex, accrescent in fruit up to 1.5 cm long and broad; capsule orbicular ..... 57. *V. crista-galli* Stev.
11. Leaves linear, linear-lanceolate or oblong-lanceolate, entire or obscurely sparsely dentate, gradually narrowed toward base, broadest above, in whorls of 4 or spaced, sometimes partly shedding ..... 48. *V. intercedens* Bornm.
- + Leaves oblong-ovate or ovate-oblong, broadest in middle part and below, margin shallowly serrate-dentate, uppermost leaves entire ..... 49. *V. cardiocarpa* (Kar. and Kir.) Walpers.
12. Floral leaves different from cauline, sometimes only upper leaves similar to bracts ..... 13.
- + Floral leaves all similar to cauline leaves ..... 16.
13. Calyx lobes free; capsule with lobes united almost up to apex ..... 14.
- + Calyx lobes united at base; capsules with lobes united at base or up to 1/2 the length at a distinct angle ..... 21.
14. Middle cauline leaves 3–5(7)-palmatipartite almost up to base; capsule orbicular-obcordate ..... 50. *V. triphyllos* L.
- + All leaves simple, elliptical or ovate, deeply dentate or entire ..... 15.
15. Corolla 5–7 mm across; style equaling or slightly exceeding capsule sinus, 1–2 mm long; capsule sinus very small; capsule oblong,



- chambers situated almost at right angles seeds ovate, rugose; leaves ovate-cordate, dentate, lower surface often reddish ..... *V. praecox* All.
- 333 + Corolla 10–18 mm across; style almost 2 times as long as capsule sinus, 3–5 mm long; capsule sinus deep and narrow; capsule orbicular-cordate, somewhat inflated; chambers situated at acute angle; seeds oblong, smooth; lower floral leaves oblong, deeply dentate, short-petiolate, upper linear, entire ..... 52. *V. amoena* Stev.
16. Leaves with 3–5 or 5–9 obtuse or subobtuse lobes, orbicular or ovate in outline ..... 17.
- + Leaves without lobes, dentate, crenate or entire ..... 18.
17. Leaves with 3–5(7) lobes; calyx lobes deltoid-ovate, base cordate, apex acute, margin long ciliate; calyx exceeding corolla; capsule glabrous ..... 58. *V. hederifolia* L.
- + Leaves with 5–9(11) lobes; calyx lobes ovate or elliptical, obtuse, narrowed toward base, ciliate; calyx slightly shorter than corolla; capsule hispid ..... 59. *V. cymbalaria* Bod.
18. Style up to 1.5(1.8) mm long, erect; flowers 6–7 mm across; capsule lobes forming right or acute angle; in latter case slightly divergent ..... 19.
- + Style 2–3 mm long, curved; flowers 7–11(15) mm across; capsule lobes forming obtuse angle, with deep sinus; calyx teeth lanceolate, divergent in fruit ..... 56. *V. persica* Poir.
19. Capsules conspicuously or obscurely veined, pubescent with simple, short and scattered glandular hairs; leaves orbicular-ovate ..... 20.
- + Capsules obscurely veined, with only glandular spaced hairs; seeds 3–8 per locule; calyx teeth separate, not overlapping, oblong-ovate to lanceolate; leaves oblong-ovate ..... 53. *V. agrestis* L.
20. Calyx lobes slightly overlapping, broadly ovate, acute, sparsely pubescent, very slightly exceeding capsule; corolla 5 mm long; capsule scarcely broader than long; style generally much exceeding capsule sinus; seeds 10–12 per locule ..... 54. *V. didyma* Ten.
- + Calyx lobes lanceolate-spatulate, obtuse, much longer than capsule, densely hairy at base; corolla 3–4 mm long; capsule almost 2 times as broad as long; style scarcely exceeding sinus ..... 55. *V. opaca* Fries.
21. (13). Cauline leaves 4, whorled at base of branched inflorescence; capsule with deep sinus; obcordate, with ovate-orbicular or orbicular, obtuse lobes, forming acute or obtuse angle; style not exceeding sinus. Plants slender, 5–7 cm tall ..... 47. *V. tenuissima* Boriss.
- 334 + Cauline leaves not whorled, opposite, sometimes alternate, usually more than 4 in number ..... 22.

22. Capsule lobes erect or slightly divergent at acute angle, not exceeding  $45^\circ$ ; calyx lobes broadly ovate, united in pairs at base; seeds smooth or slightly undulate .....23.
- + Capsule lobes diverging at angle above  $45^\circ$ , directed sideways or almost horizontal; calyx lobes narrowly lanceolate or linear; seeds extremely rugose .....25.
23. Calyx lobes and bracts entire ..... 24.
- + Calyx lobes and bracts generally dentate, sometimes only a few calyx lobes toothed ..... 37. *V. bornmülleri* Hauskn.
24. Small plants, 1–7(10) cm tall, profusely branched at base, with divaricate branches, usually reddish, hairy and glandular above; cauline leaves alternate, opposite at base and under inflorescence, ovate-rhombic or oblong, entire, rarely lower leaves sparsely subdentate; pedicels often upcurved at right angle; calyx shorter than corolla, lobes obtuse or subobtusate .....40. *V. rubrifolia* Boiss.
- + Small plants, 5–8 cm tall, branched above, rarely simple, pubescent; lower leaves ovate, others oblong, puberulent or glabrous, serrate along margin; pedicels erect .....41. *V. albanica* C. Koch.
25. Calyx lobes acuminate, narrow, linear or lanceolate-linear or oblong-linear (in which case plant profusely branched from middle); capsule lobes parted almost as far as base; pedicels in fruit horizontally divergent or reflexed; seeds transversely rugose .....26.
- + Calyx lobes ovate-oblong or ovate, acute; capsule lobes united up to  $3/4$  of its length; pedicels erect in fruit; seeds smooth or obscurely rugose .....31.
26. Plants profusely branched from base, with densely flowered long racemes; pedicels long, 4–5 times as long as calyx, almost horizontally diverging; capsule lobes curved like a horseshoe at an acute angle, glabrous, sparsely hairy along margin; style exceeding calyx .....43. *V. ramosissima* Boriss.
- + Plants branched or with very few branches with erect stems and racemose inflorescences; capsule lobes not curved like a horseshoe .....27.
- 335 27. Capsule lobes lanceolate, horizontally divergent or nearly so; all leaves serrate-dentate; pedicels reflexed in fruit; corolla 8–10 mm across, exceeding calyx; style exceeding capsule lobes .....44. *V. bucharica* B. Fedtsch.
- + Capsule lobes obovate or orbicular, diverging at  $45^\circ$  or at right angle, but not horizontally divergent .....28.
28. Plants 1–1.5 cm tall, glandular-pubescent; capsule reniform, glandular-pubescent, with orbicular-ovate lobes; style  $2/5$ – $1/2$  as long as sinus; leaves petiolate (Kugitang range) ..... 39. *V. nevskii* Boriss.

- + Plants 5–15(20) cm tall, puberulent or glabrous; capsule obovate or oblong-ovate, glabrous, hairy or glandular-pubescent, with orbicular or obovate lobes; style often exceeding sinus and capsule; if style shorter than sinus, then seeds deeply transverse-rugose, narrowed at one end, oblong-ovate; leaves petiolate or upper sessile ..... 29.
- 29. Corolla 2–3 mm across; calyx exceeding corolla; style half as long as sinus; capsule lobes obovate, diverging at 45° or slightly more; seeds deeply transverse-rugose, narrowed at one end, minute ..... 42. *V. campylopoda* Boiss.
- + Corolla 3.5–4 or 6–12 mm across; style exceeding capsule sinus, long, curved ..... 30.
- 30. Stems ranched from middle; leaves 0.5–1.75 cm long, 0.25–0.6 cm broad, ovate to lanceolate, margin serrate-dentate; pedicels glabrous; corolla 3.5–4 mm across, dark blue; calyx 2–3(4) mm long, glabrous ..... 45. *V. capillipes* Nevski.
- + Stems simple or weakly branched; leaves 0.7–2.5 cm long, 0.5–1.5 cm broad, ovate to oblong, coarsely and sparsely dentate along margin; pedicels patently glandular-hairy ..... 46. *V. stylophora* M. Pop.
- 31. (25). Corolla shorter than calyx; capsule with oblong lobes, broader than long; style shorter than sinus; seeds crispate only at margins, obscurely transverse-rugose; pedicels reflexed or erect after anthesis; leaves all opposite, oblong to lanceolate, entire or sparsely regularly dentate ..... 32.
- + Corolla equaling or slightly exceeding calyx; capsule with ovate lobes; style shorter than or equaling capsule sinus; pedicels arcuately upcurved after anthesis; lower leaves opposite, upper alternate, ovate to lanceolate, sharply serrate-dentate or almost incised ... 33.
- 32. Capsule glandular-hairy, broadly obcordate; pedicels divaricate in fruit; stems pubescent with short, rigid antrorse hairs; leaves oblong to lanceolate, acuminate ..... 34. *V. biloba* L.
- + Capsule glabrous, obovate-cordate, without ciliate margin; pedicels upcurved; stems glabrous above, diffusely crispate-pubescent below, mixed with glandular hairs; leaves lanceolate, subobtus ..... 35. *V. chantavica* Pavl.
- 33. Plants pubescent with simple regularly spaced hairs mixed with glandular hairs in inflorescence; floral leaves similar to cauline; pedicels almost equaling or exceeding bracts; leaves sharply serrate-dentate, sometimes almost incised ..... 36. *V. argute-serrata* Rgl. and Schmalh.

- + Stems and leaves densely pubescent with regularly spaced, long, glandular hairs; floral leaves different from cauline; pedicels exceeding bracts and calyx; leaves with subobtusely serrate margin ..... 30. *V. karatavica* Pavl.
- 34. (8). Pedicels shorter than or scarcely exceeding calyx ..... 35.
- + Pedicels many times longer than calyx ..... 35.
- 35. Leaves entire, serrate-dentate, dentate or crenate ..... 36.
- + Leaves pinnati- or palmatipartite ..... 37.
- 36. Lower cauline leaves cuneate at base, all leaves entire or subentire; plants subglabrous ..... 61. *V. peregrina* L.
- + Lower cauline leaves orbicular or subcordate at base; all leaves dentate or crenate-dentate; stem pubescent ..... 60. *V. arvensis* L.
- 37. Style distinctly exerted from capsule sinus; corolla deep blue, about 5 mm across; capsule with rounded base, containing 18–26 seeds ..... 62. *V. dillenii* Crantz.
- + Style scarcely exerted from capsule sinus, or not; corolla sky-blue, about 3 mm across; capsule with cuneate base .... 63. *V. verna* L.
- 38. Floral leaves similar to cauline; seeds rugose, planoconvex; capsules 5–10 mm broad, 4–5 mm long or 5–7 mm long and 4–6 mm broad, with weak, often elongated stems ..... 39.
- + Floral leaves different from cauline; seeds smooth, flat; capsule 4–6 mm broad, about 3 mm long; plant small, erect ..... 41.
- 337 39. Capsule 5–7 mm long, 4–6 mm broad, orbicular-ovate, lobes diverging at acute angle, smooth; seeds rugose; plant glandular-hairy ... 64. *V. turkmenorum* B. Fedtsch.
- + Capsule broader than long, finely reticulate or reticulate-rugose; seeds radially rugose or almost smooth; plants glabrous or sparsely crisate-pubescent ..... 40.
- 40. Capsule lobes curved hornlike, highly divergent, oblong-lanceolate, sharply reticulate-rugose; seeds 2–3 per locule, somewhat flat ..... 66. *V. ceratocarpa* C.A.M.
- + Capsule lobes erect or slightly divergent at acute angle forming narrow sinus, orbicular, shallowly and finely reticulate; seeds 3–10 per locule ..... 65. *V. filiformis* Smith.
- 41. Capsule with orbicular, obtuse lobes, diverging at acute angle, forming narrow sinus; style equaling sinus; plant erect, glabrous, diffusely pubescent or glandular-pubescent ..... 42.
- + Capsule with lobes diverging at right or obtuse angle, emarginate up to middle; style shorter than sinus; plant puberulent (Caucasus) ..... 68. *V. minima* C. Koch.
- 42. Capsule glandular-ciliate; pedicel 3–4 times as long as calyx, lower leaves ovate; plant branched from base, many-flowered ..... 69. *V. acinifolia* L.



- + Capsule glabrous; pedicels 1.5 times as long as calyx; leaves oblong; plant generally unbranched, few-flowered ..... 67. *V. perpusilla* Boiss.
- 43. (5). Leaves alternate, linear, 3–7 cm long, 2–5 mm broad ..... 139. *V. tubiflora* Fisch. and Mey.
- + Leaves opposite or whorled, 3–9 in numerous whorls, lanceolate to broadly ovate, 4–20 cm long, 2–4 cm broad ..... 44.
- 44. Leaves in whorls of 3 or opposite, broadly ovate and dentate; inflorescence short; corolla lobes obtuse ..... 142. *V. cerasifolia* Monjuschko.
- + Leaves in whorls of 5–9, oblong or lanceolate, with serrate margin; inflorescence long; corolla lobes acute ..... 45.
- 45. Corolla 7–8 mm long, lobes hairy on inner side; capsule subacute, ovate; leaf margin with teeth pointing sideways 140. *V. sibirica* L.
- + Corolla about 6 mm long, lobes glabrous; capsule obtuse, orbicular; leaf margin with upcurved teeth ..... 141. *V. sachalinensis* Boriss.
- 338 46. (3). Short, caespitose, glandular-pubescent plants ..... 138. *V. daghestanica* Trautv.
- + Plants 10–30 cm tall, glabrous or crispate-puberulent ..... 47.
- 47. Calyx lobes oblong, obtuse or subobtuse, or acuminate; corolla 9–11 mm long, with unequal obovate lobes; capsule 5–6 mm long, broadly ovate, gradually tapering; style shorter than corolla; stigma sinuate, narrow at base, gradually passing into style; leaves ovate or oblong, obtuse, subdentate along margin, short-petiolate ..... 136. *V. ruprechtii* Lipsky.
- + Calyx lobes narrowly lanceolate or linear, acute, long acuminate, highly accrescent in fruit; corolla (12)15 mm long, with broad obovate lobes; stigma slightly sinuate; capsule about 4 mm long, abruptly tapering at apex; upper leaves oblong-acuminate, sharply dentate or entire ..... 137. *V. teberdensis* (Kem.-Nath.) Boriss.
- 48. (4). Plants with more or less villous inflorescence axes, calyces, pedicels, bracts and capsules ..... 114. *V. poljensis* Murbeck.
- + Plants with glabrous or glandular-pubescent inflorescence axes, calyces, pedicels, bracts and capsules or plants glandular-pubescent throughout ..... 49.
- 49. Leaves ovate, petiolate on sterile shoots, on other shoots sessile, amplexicaul; plants pubescent throughout with glandular multicellular hairs ..... 120. *V. michauxii* Lam.
- + Leaves orbicular to linear, all sessile or petiolate, or sometimes only upper leaves sessile, and lower petiolate; plants often glabrous, rarely sparsely pubescent, mainly in inflorescence ..... 50.

50. Leaves sessile, sometimes lowermost leaves petiolate, semiamplexicaul, acute or acuminate, often oblong or lanceolate; stems weakly 4-angled or cylindrical; inflorescence often glandular-pubescent. . . . . 51.
- + Leaves rather distinctly short-petiolate, obtuse or sometimes upper leaves sessile, lower petiolate, often orbicular or elliptical; stems cylindrical; inflorescence lateral or terminal; plant glabrous throughout . . . . . 56.
51. Capsule orbicular or orbicular-elliptical, broader than long, or almost as long as broad; stems fistular . . . . . 52.
- + Capsule oblong- or ovate-ellipsoidal; slightly longer than, or 2 times as long as, broad; stems fistular or solid, hard. . . . . 55.
- 339 52. Pedicels erect, very short, scarcely exceeding calyx or bracts; inflorescence very dense, long and narrow; corolla white, exceeding calyx; capsules subobtusate; leaves large, lanceolate, acute or acuminate, broadest in lower part, amplexicaul, with sharply dentate margins, all erect . . . . . 121. *V. lysimachioides* Boiss.
- + Pedicels divergent, elongated, exceeding calyx and bracts; corolla pale sky-blue, pinkish, rarely whitish . . . . . 56.
53. Pedicels in fruit obliquely upcurved at acute angle; inflorescence generally dense, many-flowered; corolla pale sky-blue, sometimes pinkish or whitish; capsules broadly ovoid, slightly narrowed at apex, broader than long . . . . . 110. *V. anagallis-aquatica* L.
- + Pedicels diverging at right angle, rarely at acute angle; inflorescence lax, few-flowered; capsules globose or ovoid-globose, obtuse . . . . . 54.
54. Pedicels long, 5–8 mm, elongated in fruit, 3–5 times as long as bracts; corolla sky-blue; leaves short-petiolate; inflorescence lateral . . . . . 113. *V. scardica* Griseb.
- + Pedicels short, rigid, almost equaling bracts, diverging at right angle; corolla pale pink or whitish, with red veins; inflorescences lax, 15–25-flowered, generally very sparsely glandular or glabrous; capsule globose, inflated . . . . . 112. *V. anagallidiformis* Boreau.
55. Capsule oblong-ellipsoidal, 2 times as long (about 3 mm) as broad, glabrous; stems solid, pubescent or glabrous; plants often short annuals; inflorescence somewhat glandular or glabrous, 15–25-flowered; flowers on 5–6 mm long pedicels, upcurved at acute angle; corolla pale sky-blue or whitish . . . . . 111. *V. anagalloides* Guss.
- + Capsules ovoid-ellipsoidal, narrowed at apex, acuminate,  $1\frac{1}{3}$  times as long as broad, broadened at the base; stems fistular; tall perennials; inflorescence many-flowered; corolla reddish or sky-blue (*var. turkmenica* Schlenker); leaves connate at base, regularly and horizontally spaced . . . . . 122. *V. oxycarpa* Boiss.

56. All leaves rather distinctly petiolate; perennial plants, 5–60 cm tall, with rooting shoots ..... 58.  
 + Upper leaves sessile, lower petiolate or all leaves sessile; glabrous, 5–20 cm tall, weak plants ..... 57.
- 340 57. Lower leaves ovate, 3.5–4 cm long, 1.7–2.2 cm broad, somewhat sparsely serrate-dentate, with 1.5–2 cm long petioles; upper leaves oblong-obovate, with cuneate base, margin slightly serrate in upper part; plants 15–17 cm tall, perennials .... 119. *V. bobrovii* Nevski.  
 + Lower leaves ovate or elliptical, narrowed at base, almost petiolate, 10–15 mm long, 8–10 mm broad; upper leaves oblong-lanceolate, sessile, sometimes semiamplexicaul, entire or obscurely dentate; plants 5–10 cm tall, annuals ..... 118. *V. montioides* Boiss.
58. Leaves with rounded or cuneate base, with about 0.5 mm long petioles; racemes 8–15-flowered, weak; capsule glandular, ovate, acute or acuminate (Iran, mountainous Turkmenia) .....  
 ..... 117. *V. beccabungoides* Bornm.  
 + Leaves with truncate base, with 0.5–1.5 cm long petioles; racemes many-flowered, dense; pedicels rigid; capsule glabrous, orbicular or ovate ..... 59.
59. Corolla pale sky-blue with dark blue stripes; racemes lateral, dense, often long, many-flowered; leaves generally large, ovate or suborbicular to almost oblong-elliptical, broadest in middle, obtuse at apex, serrulate or crenate along margin, rarely subentire, narrowed into 5–7 mm long petiole at base; style 1.5–2 mm long .....  
 ..... 115. *V. beccabunga* L.  
 + Corolla sky-blue; flowers in lax, much branched racemes; leaves lanceolate to ovate-oblong and elliptical, broadest at base, obtuse or acute at apex, subentire or serrate, with truncate and subcordate base, short-petiolate; style 2–3 mm long (Kamchatka, Sakhalin) .....  
 ..... 116. *V. americana* (Raf.) Schweinitz.
60. (6). High-altitude branched semishrubs, 5–30 cm tall, stems woody at base ..... 61.  
 + Perennial mountain herbs ..... 62.
61. Flowers light pink with dark stripes; pedicels glandular-pubescent (Carpathian mountains) ..... 125. *V. fruticulosa* L.  
 + Flowers deep blue with purple throat; pedicels not glandular-hairy. (Arctic Europe, Carpathian mountains) .... 126. *V. fruticans* Jacq.
62. Radical leaves in dense rosette and larger than cauline leaves; stems sparsely pubescent below, glandular above; capsule glandular-pubescent; calyx with 4, sometimes 5, sepals .....  
 ..... 124. *V. bellidiodes* L.  
 + Radical leaf rosette absent; lower cauline leaves usually smaller than upper leaves; stems eglandular, crispate-hairy, uniformly pubescent

- 341 or with two opposite rows of hairs, or glabrous; sometimes pedicels and calyx glandular-hairy; calyx 5-lobed ..... 63.
63. Corolla greenish white; leaves glabrous, smooth, obscurely dentate or entire; upper leaves alternate, oblong to oblong-lanceolate; lower leaves opposite, ovate to oblong-lanceolate; stem with scale leaves in lower part ..... 132. *V. tianschanica* Lincz.
- + Corolla dark blue, sky-blue, bluish violet, pink or bluish white, rarely white; leaves somewhat pubescent, sometimes glabrous, often opposite; stems usually without, rarely with scale leaves ..... 64.
64. Stems, at least in lower part, with two opposite rows of hairs ..... 65.
- + Stems uniformly pubescent, villous or glabrous. .... 67.
65. Bracts with long hairs, much exceeding calyx and corolla; inflorescence in bud thereby appearing crested; corolla dark blue, 6–7 mm long, 1/2 united into tube, lobes unequal, acute; stamens shorter than corolla; style short, not exerted; capsule ovate, tapering upward, subacute; seeds ovate, angular, acute on one side subobtusate on other; style short, included (Pamiro-Alai) .. 135. *V. fedtschenkoi* Boriss.
- + Bracts not exceeding calyx; inflorescence not crested in bud; corolla deep sky-blue, dark blue, lilac or whitish, with very short tube, limb almost regular with subobtusate, unequal lobes; stamens usually equaling corolla or slightly exerted; style exceeding corolla; capsule suborbicular or obovate, with shallow sinus; seeds orbicular-ovate ..... 66.
66. Pedicels much shorter than calyx, villous; calyx villous with long white hairs; calyx lobes lanceolate; corolla whitish or lilac, glabrous inside; capsule suborbicular with scarcely discernible sinus; stem without scale leaves (Dzh.-Tarbagatai) ..... 131. *V. serpylloides* Rgl.
- + Pedicels almost equaling calyx, shorter than bracts; calyx ciliate; lobes ovate-lanceolate; corolla deep sky-blue, dark blue or lilac, 6–7 mm long with hairy ring in throat; capsule obovate, glabrous, entire or with small sinus. (Soviet Central Asia, Western and Eastern Siberia, Kamchatka) ..... 129. *V. densiflora* Ldb.
67. Leaves glabrous, rarely with few white hairs or ciliate only along margin, entire or obscurely dentate; pedicels 1–2 mm long ..... 68.
- + Leaves canescent, long villous or crispate-puberulent, later subglabrous or only upper surface glabrous or subglabrous, in latter case pedicels 4–6 mm long and in fruit 7–10 mm long; leaves serrate, denticulate or entire; sometimes leaves entire only in upper part and at base, but serrate-dentate in middle ..... 69.
- 342



68. Leaves not ciliate, sessile, opposite or in whorls of three, sometimes upper leaves alternate, oblong or oblong-ovate, lower leaves ovate, rounded at base, subacute or subobtuse; corolla dark blue, about 9 mm across; capsule oblong, without sinus at apex, puberulent; style long, curved; plants (12)20–35 cm tall (Pamiro-Alai) ..... 133. *V. gorbunovii* Gontsch.
- + Leaves ciliate, short-petiolate; upper leaves alternate, others opposite, elliptical, ovate or oblong, obtuse and short-pointed with cuneate base; lower leaves scale-like; corolla sky-blue, bluish violet or white, 4–7 mm long; capsule obovate, shallowly emarginate at the apex, with very short style; plants 5–15(20) cm tall ... 123. *V. alpina* L.
69. Lower cauline leaves scale-like; upper surface of leaves diffusely pilose, lower glabrous or diffusely crispate-hairy or both surfaces glabrous; pedicels 4–6 mm long, 7–10 mm in fruit ..... 70.
- + Scale leaves absent; leaves canescent on both surfaces or long villous ..... 71.
70. Lower leaves orbicular or ovate, subentire, others oblong or ovate, with serrate-dentate margin; corolla bluish violet; capsule oblong-obovate, 5–6 mm long, shallowly emarginate (Sayans, Altai) ..... 128. *V. macrostemon* Bge.
- + Lower leaves ovate or oblong-ovate, sometimes suborbicular, sparsely denticulate; corolla sky-blue or dark blue; capsule about 4 mm long, subacute, with scanty white hairs. (Pamiro-Alai) ..... 130. *V. macrostemonoides* Zak.
71. Plant 5–6(10) cm tall, densely caespitose; leaves canescent on both surfaces, ovate or orbicular, short-pointed, serrate or denticulate; pedicels 5–6 mm long, exceeding calyx; stamens equaling corolla or slightly exserted; capsule about 5 mm long, ovate, not emarginate, with long hairs and style equaling capsule 127. *V. lütkeana* Rupr.
- 343 + Plant 14–30 cm tall; leaves long hairy, short-petiolate, ovate-oblong or oblong-lanceolate, entire at apex and base, serrate-dentate in middle; pedicels short, up to 2 mm in fruit; stamens 1/2 as long as corolla lobes; capsule 9–10 mm long, 2–3 times as long as calyx, oblong-ovate or oblong, with a small sinus, villous, with short style ..... 134. *V. ciliata* Fisch.
72. (7). Stems uniformly leafy, with creeping, decumbent, rooting and ascending shoots; corolla deep blue, white or pale sky-blue with pink veins; leaves sessile, orbicular or oblong to lanceolate; flowers in short racemes ..... 73.
- + Stems without creeping and rooting shoots; leaves crowded at base of peduncles and in rosettes, or stems uniformly leafy ..... 75.

73. Leaves orbicular or ovate, obtuse; plants puberulent or glabrous; corolla white or pale sky-blue, 7–8 mm across, slightly exceeding calyx; capsule with rounded base ..... 9. *V. serpyllifolia* L.  
 + Leaves oblong or oblong-lanceolate to lanceolate, acute; plants partly pubescent with multicellular or glandular hairs ..... 74.
74. Corolla deep blue, 9–10 mm across; lower part of stem pubescent with long, glandular, often viscid hairs; capsule with cuneate base, glandular (Kamchatka, Komandorskie islands) ..... 10. *V. humifusa* Dickson.  
 + Corolla pale bluish, 2 times as long as calyx; stem eglandular; raceme short, covered with multicellular hairs (Kamchatka) ..... 11. *V. riederiana* Gandoger.
75. Leaves in lower part of stem and in rosettes, reduced upward; capsule not acuminate, orbicular, ovate or cordate ..... 76.  
 + Stems uniformly leafy; capsule somewhat acuminate, oval ..... 81.
76. Leaves deeply dentate or pinnately lobed; capsule oblong to cordate, emarginate ..... 8. *V. schmidtiana* Rgl.  
 + Leaves regularly denticulate or subentire; capsule orbicular .... 77.
77. Rootstock long, creeping; stem with numerous sterile shoots at base; leaves oblong-lanceolate to narrowly lanceolate, serrate or dentate, dark green, acute; upper leaves sessile; pedicels in flowers and fruits arcuately curved away from axis; calyx lobes oblong-ovate; corolla deep sky-blue; capsule suborbicular, as broad as or broader than long, with 1 mm long sinus; seeds about 1 mm in diameter ..... 5. *V. schistosa* E. Busch.  
 + Rootstock shorter; stem with less developed, sterile shoots; leaves obovate to lanceolate, obtuse or subobtuse, light green, sometimes white-cartilaginous along margin, shallowly serrate-dentate in upper part or entire, all or only lower leaves narrowed into winged petiole; pedicels appressed to inflorescence axis; raceme pyramidal; calyx lobes oblong; corolla light sky-blue; capsule orbicular-ovate, with 1–3 mm long sinus ..... 78.
78. Leaves bluish-gray, somewhat thick, coriaceous, glabrous, entire or scarcely crenate, crowded at base of stems; cauline leaves extremely reduced; plants glabrous, glandular in upper part ..... 79.  
 + Leaves green, thin, glabrous or diffusely pubescent, usually dentate ..... 80.
79. Leaves broadly ovate or orbicular, crenate along margin, sessile or with broad and short petiole; calyx 1/3 as long as corolla, with broadly ovate lobes; corolla pale sky-blue; capsule suborbicular; plants 4–8 cm tall ..... 2. *V. imeretica* Kem.-Nath.  
 + Leaves lanceolate, narrowed into petiole, entire; calyx 1/2 as long as corolla, with elongated lobes; corolla deep sky-blue, dark bluish or

- lilac; capsule obovate; plants 30–80(100) cm tall ..... 1. *V. gentianoides* Vahl.
80. Plants 45–60 cm tall; lower leaves large, elongated, obovate; cauline leaves regularly spaced, large; inflorescence narrow and long raceme; flowers on long, up curved pedicels; capsule lanate, distinctly reticulate, broadly ovate, narrowed at apex and weakly emarginate .... 4. *V. charadzeae* Kem.-Nath.
- + Plants up to 10 cm tall, subglabrous; leaves crowded at stem base; inflorescence broad pyramidal raceme; flowers on hooked pedicels; capsule glandular or pubescent ..... 3. *V. kamulariae* Kuthath.
81. Capsule scarcely emarginate, villous at apex; style slightly shorter than capsule; seeds about 1.5 mm long, ovate, obtuse (Far East, Kamchatka) ..... 7. *V. stelleri* Pall.
- + Capsule oblong-ovate, narrowed at apex, obtuse, not emarginate, pubescent and diffusely glandular; style 1.5 times as long as capsule; seeds 0.5–5.75 mm long, ovate or oblong, concave, slightly curved; scale leaves present at base of stems (Caucasus) ..... 6. *V. monticola* Trautv.
- 345 82. (7). Leaves alternate, rarely a few opposite ..... 83.
- + Leaves opposite or whorled ..... 87.
83. Flowers sessile, subsessile or on pedicels 1/3–1/2 as long as calyx; leaves linear-lanceolate or oblong, pinnatipartite, but not up to midrib, into oblong or lanceolate subobtuse lobes; inflorescence spicate, dense, compact; plants glandular-pubescent (Altai mountains) ..... 32. *V. sessiliflora* Bge.
- + Pedicels equaling calyx or longer; leaves linear or lanceolate-linear to oblong, denticulate, with narrow, large, unequal teeth or entire or all or almost all leaves parted into linear or filiform, sometimes lanceolate, discrete lobes; plants glabrous or canescent ..... 84.
84. Leaves deeply pinnatisect with somewhat long, linear, sometimes lanceolate, discrete lobes, 0.5–2 mm broad, often glabrous and somewhat thick; corolla sky-blue; stamens scarcely exserted ..... 33. *V. pinnata* L.
- + Leaves entire, linear or lanceolate, denticulate, coarsely dentate, sometimes lower leaves, or upper leaves, with large, unequal lobes sometimes all leaves entire; corolla deep blue; stamens long exserted ..... 85.
85. Leaves denticulate or serrate, linear or linear-lanceolate (Transbaikal Region, Soviet Far East) ..... 29. *V. linariifolia* Pall.
- + Leaves unequally large-toothed or only upper leaves entire, or all leaves entire, linear to oblong-lanceolate, curved; axillary shoots often present, consisting of leaf clusters ..... 86.

86. Plants subglabrous or covered with short curved hairs; leaves linear to oblong-linear, acuminate, with narrow, unequal, large teeth along margin, or upper leaves, and sometimes even all leaves, entire and linear; calyx 1.3 mm long, lobes acuminate, lanceolate or ovate-oblong, with glandular-ciliate margin (Soviet Central Asia) ..... 30. *V. laeta* Kar. and Kir.
- + Plants densely canescent; upper leaves linear or lanceolate to oblong, broadened above, with subacute apex, often entire, sometimes sparsely denticulate, somewhat thick; calyx 1–1.5 mm long, densely pubescent; lobes ovate or oblong-ovate, acute (Zaisan Lake) ..... 31. *V. arenosa* (Serg.) Boriss.
87. Flowers sessile; pedicels of lower flowers 1–2 mm long; bracts exceeding pedicels; leaves crenulate or obscurely crenate, opposite, densely pubescent or glabrous; racemes generally solitary; plants 15–40 cm tall ..... 88.
- 346 + Pedicels exceeding 2 mm; bracts shorter than pedicels; leaves often sharply serrate or subdentate, opposite, sometimes whorled, sparsely pubescent or glabrous; racemes several together; plants 40–150 cm tall ..... 95.
88. Plant somewhat densely canescent or greenish, with somewhat rigid patent hairs, sometimes intermixed with glandular hairs or subglabrous or crispate-puberulent ..... 89.
- + Plant densely white-tomentose, with long, tangled appressed hairs, glandular hairs absent; sometimes upper surface of leaves subglabrous ..... 93.
89. Flowers white, dry flowers yellow; shoots with leaf clusters arising in leaf axils; calyx teeth linear, elongated; capsule pubescent at apex (Tien Shan) ..... 28. *V. alata* M. Pop.
- + Flowers dark blue or pale sky-blue, rarely white or pink ..... 90.
90. Plant green and densely glandular-pubescent throughout, viscid; leaves broadly elliptical, cauline leaves sessile, semiamplexicaul; inflorescence spicate, dense, obtuse at apex or short-pointed (Altai, Tarbagatai, Tien Shan) ..... 25. *V. porphyriana* Pavl.
- + Plant grayish green, pubescent with spaced simple hairs intermixed with glandular hairs on bracts, pedicels and calyces, or glandular hairs absent; leaves oblong to lanceolate, petiolate; inflorescence an elongated raceme, compact or somewhat lax, tapering upward, pointed ..... 91.
91. Plants pubescent above with glandular and soft simple hairs; leaves subdentate, upper surface shining, lower glabrous; corolla twisted at base, pale sky-blue, blackening on drying, with linear, acuminate, converging lobes; stamens shorter than corolla; capsule glandular ..... 27. *V. orchidea* Crantz.



- + Plant canescent with simple hairs, sometimes glabrous below; leaves canescent or greenish, serrate-dentate along margin; corolla not twisted at base, dark blue, sometimes pink or white, with lanceolate or oblong-lanceolate lobes; stamens equaling corolla or longer; capsule pubescent or glabrous ..... 92.
- 92. Corolla dark blue, with oblong-lanceolate subobtusate lobes; stamens exceeding corolla; capsule glabrous; calyx with long patent hairs; plants pubescent above with long simple hairs ..... 26. *V. barrelieri* Schult.
- + Corolla bright sky-blue, dark blue, pink or white, with lanceolate acute lobes; stamens almost equaling corolla; capsule pubescent, slightly shorter than calyx; calyx puberulent; plants patently puberulent, grayish or green ..... 24. *V. spicata* L.
- 347 93. Plants (10)20–45(60) cm tall; inflorescence 3–10(30) cm long, 1.2–1.5(2) cm broad ..... 21. *V. incana* L.
- + Plants 10–15(30) cm tall; inflorescence 2–6 cm long, about 1 cm broad, or inflorescence 3–10 cm long, 1–3.2 cm broad; leaves predominantly ovate to oblong, large, crowded at base or predominantly linear and linear-lanceolate ..... 94.
- 94. Leaves 1.5–6 cm long, 8–20 mm broad, ovate to oblong, subobtusate at apex; inflorescence a compact terminal raceme 3–10 cm long, 1.3–2 cm broad; corolla up to 9 mm across, tube 2–3 mm broad, lobes subacute (Crimea) ..... 23. *V. hololeuca* Juz.
- + Leaves 1–2 cm long, 3–5 mm broad, linear or linear-lanceolate, lower leaves spatulate-oblong; inflorescence dense or somewhat lax raceme 2–6 cm long and about 1 cm broad; corolla 3–4 mm across, lobes subobtusate (Siberia, mainly in Transbaikal Region) ..... 22. *V. bellidifolia* Juz.
- 95. Leaves with orbicular or cordate base, base sometimes cuneate, in which case leaves narrow, lanceolate-linear, with large, often sharp teeth or doubly dentate, lanceolate or oblong-lanceolate and usually glabrous or glandular-pubescent; inflorescences often solitary, terminal, sometimes with lateral racemes as well; bracts much exceeding pedicels; gradually tapering; capsule often shorter than calyx or slightly longer, in which case leaves glandular-pubescent, or if capsule much longer than calyx, then leaves sessile, with cordate base ..... 97.
- + Leaves narrowed at both ends, with cuneate base, lanceolate, sharply doubly serrate, entire in upper part, short-petiolate; inflorescence often consisting of numerous terminal and lateral, dense, tapering racemes; capsule exceeding calyx; bracts linear, exceeding or equaling pedicels; plants generally pubescent ..... 96.

96. Capsule 3–4 mm long, 2–3 mm broad, obcordate, 1.5 times as long as calyx; calyx lobes oblong-ovate or lanceolate; inflorescence paniculate, racemes numerous, crowded at apex, elongated, tapering; leaves 3–4 together or opposite, 3–8 cm long, 1–3 cm broad, slightly grayish due to puberulence ..... 19. *V. spuria* L.
- + Capsule 5–7 mm long, obcordate, 2–3 times as long as calyx; calyx lobes triangular-lanceolate, ciliate; inflorescence pubescent spicate raceme; leaves opposite, large, 6–14 cm long, 1.5–3.5 cm broad, erect, slightly appressed to stem, with lower surface puberulent along veins; upper surface glabrous ..... 20. *V. komarovii* Monjuschko.
97. Calyx lobes linear, 5–6 mm long, equaling or slightly shorter than corolla, densely covered with long hairs, along with bracts, pedicels and capsule; corolla pale blue, with linear-cuneate lobes tapering upward, densely long-villous in throat; leaves opposite or three in whorl, sessile, sparsely hairy and glandular on both surfaces; stems with scale leaves at base (Altai, Sayans) 18. *V. sajanensis* Printz.
- + Calyx lobes much shorter than corolla, glabrous or ciliate along margin or glandular-pubescent, but not hairy; corolla dark blue, white or pink, lobes orbicular to oblong-lanceolate, glabrous or puberulent in throat; leaves often opposite or 3–4 together with 3–5 mm long and even up to 10 mm long petioles, sometimes a few leaves sessile; stems without scale leaves at base ..... 98.
98. Leaves sessile or with 3–5 mm long petioles, almost horizontally spreading or reflexed, pubescent on both surfaces or pubescent only along veins or glabrous; calyx with narrowly linear, almost filiform lobes, exceeding capsule; corolla lobes notched at apex; capsule, glabrous, orbicular (Sakhalin) .. 16. *V. subsessilis* (Miq.) Carrière.
- + Petioles about 1 cm long or if petioles 3–5 mm long, then capsule ovate, 4–5 mm long, about 3 mm broad; calyx about 1.5 mm long, lobes ovate, obtuse; leaves not reflexed, glabrous or pubescent mainly along veins or densely glandular-puberulent ..... 99.
99. Leaves subsessile or with broad 3–5 mm long, petioles, ovate, oblong or oblong-lanceolate; inflorescence broad, dense and short raceme, up to 2 cm broad, 1–10 cm long; capsule 4–5 mm long, 3 mm broad; calyx about 1.5 mm long ..... 13. *V. septentrionalis* Boriss.
- + Petiole up to 1 cm long; inflorescence long, sometimes up to 25 cm long, dense raceme; capsule 2–3(4) mm long, orbicular, obcordate or orbicular-ovate, glabrous or sparsely pubescent ..... 100.
100. Corolla white or pink, sometimes deep blue, in which case leaves glandular-pubescent ..... 101.
- + Corolla dark blue or bluish violate; leaves glabrous or sparsely puberulent ..... 102.

101. Corolla white or pink, sometimes deep blue, about 7 mm. long, lobes obtuse ovate; bracts narrowly linear; leaves densely glandular-puberulent or sparsely hairy, somewhat deeply, coarsely and unequally dentate, with broad teeth ..... 17. *V. dahurica* Stev.
- 349 + Corolla white or pink, about 5 mm long, lobes oblong-lanceolate; bracts leaf-like, lanceolate, serrate, similar to cauline leaves; upper bracts entire, subobtusate; lower leaf surface villous, mainly along veins, upper surface sparsely hairy, sharply serrulate ..... 15. *V. olgensis* Kom.
102. Leaves oblong or oblong-lanceolate with subcordate or truncate base to lanceolate-linear with cuneate base (var. *maritima*), glabrous or sparsely pubescent on lower surface along veins; stems glabrous or puberulent, 40–120 cm tall; calyx lobes lanceolate or oblong, ciliate ..... 12. *V. longifolia* L.
- + Leaves triangular, oblong-ovate, or oblong-lanceolate, with rounded or cordate base, glabrous; stems patently pubescent above, 20–30 cm tall; calyx lobes linear, at least 1/3 as long as corolla (Carpathian mountains) ..... 14. *V. bachofenii* Heuff.
103. (4). Leaves entire, 15–22 mm long, 4–7 mm broad, coriaceous, sessile, almost recurved along margin, cuneate, densely pubescent; stems woody, hard at base, densely leafy; capsule oblong-ovate, villous ..... 91. *V. galathica* Boiss.
- + Leaves not coriaceous, usually dentate, entire, dissected or lobed ..... 104.
104. Calyx 5-partite, unequally lobed, fifth lobe often much smaller; racemes mainly opposite, many-flowered ..... 105.
- + Calyx 4-partite, sometimes with scarcely discernible fifth lobe, in which case plants caespitose, often spreading, with rooting shoots; racemes mainly solitary, many-flowered or lax and few-flowered ..... 110.
105. Leaves 1–2-pinnatisect to pinnatipartite ..... 109.
- + Leaves entire, dentate, or serrate ..... 106.
106. Leaves cordate to rounded or broadly and short-cuneate at base ... 107.
- + Leaves with somewhat cuneate base ..... 108.
107. Leaves ovate or oblong-ovate, 3–5.5 cm long, 1.5–2.5 cm broad, cordate at base, subamplexicaul, sessile or short-petiolate; plants 30–70(100) cm tall, somewhat crispate-hairy (European USSR; Caucasus) ..... 74. *V. teucrium* L.
- + Leaves oblong-ovate to lanceolate and linear-lanceolate, 1.5–4 cm long, 0.3–2 cm broad, sessile, rounded or broadly cuneate at base; plants (10)20–45(50) cm tall, puberulent. (Western Siberia, Soviet Central Asia) ..... 76. *V. krylovii* Schischk.



108. Sterile shoots numerous, partially ascending or decumbent, fertile shoots erect or ascending; lower leaves narrowly ovate, upper oblong-lanceolate or linear-lanceolate, crenate; stems numerous, 5–30 cm tall; corolla 6–8 mm across, bluish lilac or pale sky-blue; capsule broadly obovate, shallowly emarginate ..... 77. *V. prostrata* L.  
 + All stems erect, leaves oblong to lanceolate-linear, serrate or dentate; upper leaves sometimes entire; stems solitary or few, 30–80 cm tall; corolla 10–13 mm across, bright blue; capsule somewhat notched, obovate-cordate ..... 75. *V. dentata* Schmidt.
109. Lobes of leaves linear or linear-lanceolate; flowers in many-flowered lateral racemes, 2–4 in leaf axils, on erect pedicels; capsule broadly obovate with rounded base; style shorter than corolla ..... 78. *V. austriaca* L.  
 + Lobes of leaves narrowly linear or almost filiform; flowers in long many-flowered inflorescences; capsule obovate with cuneate base; style almost 2 times as long as capsule (Azerbaijan) ..... 79. *V. arceutobia* Woron.
110. (103). Racemes lateral, solitary or alternate, few-flowered, lax, long; capsule large, reniform, broader than long, often exceeding calyx, equaling it or, rarely, slightly shorter; stem weak, short, often decumbent and rooting ..... 111.  
 + Racemes many-flowered, dense or somewhat lax or few-flowered, corymbose at anthesis; capsule orbicular or obovate, as long as or longer than broad, shorter than calyx ..... 113.
111. Leaves sessile or subsessile, linear-lanceolate, denticulate, retroserate toward base ..... 112.  
 + Petioles 1–2 cm long; leaves ovate, rarely orbicular; capsule suborbicular or elliptical; calyx lobes 1/2–2/3 as long as capsule ..... 97. *V. montana* L.
112. Corolla 2.5–5 mm across; lobes orbicular or ovate; stamens almost equaling corolla; racemes 7–8(10)-flowered; leaves 2–5 cm long, 3–7 mm broad, sessile, with denticulate margin ..... 95. *V. scutellata* L.
- 351 + Corolla about 1 mm long, 3 ovate-orbicular and 1 oblong; corolla lobes stamens shorter than corolla; racemes 1–3-flowered; leaves 5–10 mm long, 2–2.5 mm broad, short-petiolate, with teeth visible only under magnifying lens ..... 96. *V. callitrichoides* Kom.
113. (110). Plants 3–10(15) cm tall, primarily of alpine and subalpine zones, caespitose, often woody at base, decumbent or creeping ... 121.  
 + Taller herbs, (10)15–35(90) cm tall, erect or partially ascending, sometimes woody at base and rooting ..... 114.



114. Pedicels erect, shorter than calyx, rarely very slightly longer; leaves orbicular, ovate or elliptical, denticulate or serrate-dentate, sometimes subentire, rounded at base; pedicels slender and long; calyx shorter than capsule; corolla almost 2 times as long as calyx; seeds planoconvex, hilum not discernible; plants pubescent ..... 90. *V. officinalis* L.  
 + Pedicels often diverging, exceeding calyx or shorter, in which case plant features different ..... 115.
115. Calyx 2 times as long as fruiting pedicel or about 2/3 as long .... 116.  
 + Calyx 1/5–1/2 as long as fruiting pedicel ..... 119.
116. All leaves rather long petiolate, ovate; capsule orbicular, glabrous; plants blackening on drying ..... 73. *V. nigricans* C. Koch.  
 + Leaves sessile or partly upper and lower leaves short-petiolate; capsule generally pubescent with simple or glandular hairs, obovate-cordate, with cuneate base ..... 117.
117. Stems glabrous or diffusely pubescent, slender, sometimes reddish, 10–40 cm tall; upper leaves lanceolate, shallowly serrate or entire; seeds large, 2–5 per locule ..... 72. *V. umbrosa* M.B.  
 + Stems pubescent with two rows of hairs, 10–45(50) cm tall, or hairy all around with patent crispate hairs, in which case 50–90 cm tall; leaves ovate or orbicular-ovate to oblong-ovate; seeds numerous .. 118.
118. Stem pubescent all over; racemes generally long, many-flowered, in many leaf axils in upper part; seeds rugose, trigonus, biconvex (Caucasus) ..... 71. *V. melissifolia* Desf.  
 + Stem pubescent with two rows of hairs; racemes short, few-flowered, in axils of 2–4-pairs of upper leaves; seeds smooth, ovate, flat .... 70. *V. chamaedrys* L.
119. Leaves pinnatisect or pinnatipartite, with oblong or linear-cuneate lobes, ovate or oblong in outline; lower leaves pinnately lobed; calyx exceeding capsule, with broadly lanceolate or oblong lobes; corolla white, with lilac-colored stripes ..... 80. *V. caucasica* M.B.  
 + Leaves entire, ovate or oblong, dentate or serrate-dentate; calyx shorter than or equaling capsule ..... 120.
120. Seeds flat; stems (10)30–70 cm tall; calyx teeth lanceolate, subobtusate, glandular-ciliate; corolla pale pink or pale sky-blue or deep sky-blue, with dark stripes, sometimes reddish; stamens exceeding corolla or slightly shorter ..... 98. *V. maxima* Mill.  
 + Seeds scaphoid, concave; stems 14–30 cm tall; calyx with oblong acute teeth; corolla white; stamens shorter than corolla ..... 103. *V. peduncularis* M.B.
121. Seeds scaphoid, concave ..... 122.

- + Seeds flat or biconvex ..... 127.
122. Leaves 1-2-pinnatisect; lobes about 1 mm broad; calyx 5-partite, with 5 small, often caducous lobes; capsules equaling or almost 2 times as long as calyx ..... 109. *V. armena* Boiss.
- + Leaves entire or pinnatisect into 5-7 obtuse, oblong or ovate lobes ..... 123.
123. Leaves petiolate, orbicular or obovate; orbicular leaves with cuneate entire base, others cristate-crenate, sometimes almost doubly dentate and incised ..... 108. *V. microcarpa* Boiss.
- + Leaves sessile or subsessile, suborbicular to oblong and lanceolate, shallowly dentate or entire, sometimes margin reflexed or leaves pinnatisect into 5-7 lobes, with 3-5 mm long petioles ..... 124.
124. Leaves entire ..... 125.
- + Leaves pinnatisect into 5-7 lobes, ovate in outline, 7-10 mm long, with 3-5 mm long petioles ..... 107. *V. oltensis* Woron.
125. Plants light green; leaves broadly ovate or suborbicular, narrowed into short petiole, with rounded, cordate or short-cuneate base, upper surface rugose, lower with long crispate hairs, prominent veins and reflexed margin, sparsely dentate or entire; calyx lobes broadly ovate, densely villous; capsule glabrous .... 104. *V. petraea* (M.B.) Stev.
- + Plants generally dark green or grayish green due to pubescence; leaves oblong to linear lanceolate, with cuneate base, glabrous or sparsely hairy, sparsely shallowly dentate along margin or entire; calyx lobes oblong, densely glandular-hairy ..... 126.
126. Plants green, puberulent; leaves oblong-lanceolate to linear-lanceolate, subobtusate, with reflexed margin; calyx lobes acute, bracts glandular-hairy ..... 106. *V. baranetzki* Bordz.
- + Plants grayish green, densely villous; leaves oblong to elliptical and lanceolate, subacute or subobtusate, densely glandular pubescent ... 105. *V. propinqua* Boriss.
127. Leaves entire or dentate, sometimes lower, leaves deeply pinnatifid-dentate ..... 131.
- + Leaves pinnatipartite, pinnatisect or palmatipartite ..... 128.
128. Leaves pinnatipartite or pinnatisect; corolla dark blue, sky-blue, reddish or white ..... 129.
- + Leaves palmately lobed, with 3-4-5 ovate lobes, orbicular-ovate in outline; corolla red; leaves often reflexed along margin ..... 130.
129. Pedicels 3-10 mm long, 1.5-2 times as long as calyces and bracts ..... 85. *V. multifida* L.
- + Pedicels spaced, diverging at right angles, 10-20 mm long, 2-3 times as long as calyces ..... 86. *V. filifolia* Lipsky.
130. Leaves with 3-5 oblong-rhombic or obovate lobes; petioles 1-5 mm long, glabrous or subglabrous; racemes lax, few-flowered, lateral and

- terminal; bracts ovate-rhombic, short-petiolate; capsule base cuneate ..... 87. *V. czerniakowskiana* Monjuschko.
- + Leaves with three linear or lanceolate-linear lobes, with short winged petiole, bluish gray due to dense setaceous pubescence; racemes many-flowered, dense, lateral; bracts oblong, sessile; capsule base rounded ..... 88. *V. tripartita* Boriss.
131. Stems with 2 opposite hairy rows; racemes lax, few-flowered, on long glabrous peduncles, 3–4 times as long as sterile shoots; calyx lobes glabrous ..... 102. *V. glabrifolia* Boriss.
- + Stems uniformly pubescent or glabrous; racemes on rather short peduncles; calyx lobes glabrous or pubescent ..... 132.
- 354 132. Leaves orbicular or ovate, entire or sparsely denticulate. Small high-altitude and arctic plants with partially ascending, densely leafy, short stems, sometimes with leaves crowded in radical rosettes; inflorescence almost corymbose ..... 133.
- + Leaves orbicular-spatulate, obovate, oblong to linear, entire or lower leaves deeply pinnatisect-dentate ..... 135.
133. Pedicels equaling or 2–3 times as long as calyx lobes; leaves crowded in lax radical rosettes ..... 134.
- + Pedicels 3–5 times as long as calyx lobes; stems uniformly leafy or leafy only in upper part of plant (Carpathian mountains) ..... 93. *V. baumgartenii* Roem. and Schult.
134. Capsules 9–11 mm long, 7–8 mm broad, oval; style almost equaling capsule; flowers 4–8 in racemes; corolla 8–10 mm long; calyx lobes villous (Kamchatka) ..... 94. *V. grandiflora* Gaertn.
- + Capsules 4–6 mm long, obovate-cordate, patently glandular-pubescent; style 1/4–1/2 of capsule; flowers 1–5 in racemes; corolla 6–8 mm as long as long (Carpathian mountains) ..... 92. *V. aphylla* L.
135. (132). Leaves small, orbicular, obovate or spatulate or triangular-ovate, with few teeth, entire or crenate ..... 136.
- + Leaves linear or oblong-ovate to linear, entire or sometimes lower leaves incise-dentate, entire or dentate ..... 138.
136. Leaves deltoid-ovate or oblong-ovate, broadest at truncate or rounded base, margin crenate and often reflexed or subentire; racemes few-flowered, lax, glandular-pubescent; calyx lobes oblong ..... 100. *V. kopetdaghensis* B. Fedtsch.
- + Leaves orbicular, broadly obovate, spatulate to oblong, broadest in upper part or in middle, entire or with scarcely visible teeth; racemes eglandular; calyx lobes obovate to lanceolate (Caucasus) ..... 137.
137. Stem with scale leaves in lower part; leaves thin, not fleshy, obovate, spatulate or orbicular, entire or with scarcely visible teeth; flowers

- on short peduncles; calyx lobes white-hairy along margin ..... 99. *V. minuta* C.A.M.
- + Stems without scale leaves; leaves rather thick, fleshy, oblong or ovate, entire or with 2–5 teeth; flowers on long peduncles; calyx lobes glabrous or subglabrous ..... 101. *V. telephiifolia* Vahl.
138. Corolla red; plant grayish velutinous, glandular in upper part, caespitose, 6–12 cm tall, with linear sessile leaves; calyx 4-partite, glandular-setaceous; capsule orbicular, glandular-pubescent; seeds oblong (Kopet-Dag) ..... 89. *V. khorossanica* Czernjak.
- + Corolla dark blue, sky-blue, pink, sometimes reddish; plants crispate puberulent, sometimes glabrous or glandular in inflorescence, 5–30 cm tall; leaves oblong-ovate to linear-lanceolate, entire or incise-dentate, short-petiolate or sessile; calyx with 4–5 unequal lobes, glabrous or ciliate along margin, rarely villous, with intermixed glandular hairs; capsule glabrous or glandular-pubescent, obcordate or reniform; seeds ovate (Caucasus, Crimea) ..... 139.
139. Calyx lobes oblong-elliptical; fertile shoots densely leafy; old shoots leafless, due to early shedding leaves; year-old shoots elongated; leaves oblong-lanceolate, 10–14 mm long, 2–4 mm broad ..... 84. *V. denudata* Alboff.
- + Calyx lobes linear-lanceolate; all shoots leafy; leaves linear or linear-lanceolate, lower leaves oblong, or 5–7 mm long, 2–3(5) mm broad, often oblong-ovate, sometimes upper leaves linear-lanceolate ..... 140.
140. Leaves 5–7 mm long, 2–3(5) mm broad, often oblong-ovate, sometimes upper leaves linear-lanceolate, often with reflexed margin; pedicels 5–8 mm long; calyx 4-lobed; corolla deep blue ..... 83. *V. kurdica* Benth.
- + Leaves linear or linear-lanceolate, lower leaves sometimes oblong; calyx 4–5-lobed; corolla often light sky-blue to dark blue, pinkish or reddish ..... 141.
141. Corolla pinkish, reddish or pale sky-blue; leaves generally linear or linear-lanceolate, lower leaves sometimes oblong; flowers in short, lax racemes, unilateral in fruit (Caucasus) ..... 81. *V. orientalis* Mill.
- + Corolla bright sky-blue to dark blue; leaves lanceolate, lower leaves oblong or lanceolate; racemes many-flowered ..... 82. *V. taurica* Willd.

Subgenus 1. *VERONICELLA* (Fourr.) Boriss. comb. nov.—Genus *Veronicella* Fourr. in Ann. Soc. Linn. Lyon, NS. XVII (1869) 128 (emend.).—Calyx 4- to 5-partite. Corolla with very short tube, rotate, sometimes with slightly recurved lobes, often with hairy ring in throat,



- 356 deep blue, sky-blue, white, pink, rarely yellow, sometimes red or reddish. Capsule compressed or slightly so, often with highly coalescent valves. Seeds flat, biconvex, or scaphoid. Perennials, rarely annuals growing in moist soils, sometimes forming turf.

Section 1. *Euveronica* Griseb. Spicil. fl. Rumel. II (1844) 27.—Section *Veronicastrum* Benth. in DC. Prodr. X (1846) 479, p.p. non Gen. *Veronicastrum* Heist. ex Fabr. (1759); Ldb. Fl. Ross. III, 1, 246; Pflanzenfam. IV, 3b, 85; Wulff in Tr. Tifl. bot. sada, XV, 78.—*Veronicastra seminibus planis* Koch, Syn. fl. Germ. ed. II (1838) 529.—Racemes terminal, short or elongated, compact or interrupted; flowers distinctly pedicellate. Lower bracts almost similar to leaves. Calyx 4-partite. Corolla with very short, scarcely discernible tube, rotate. Capsule strongly compressed laterally, often emarginate, with valves highly coalescent, later separating. Seeds compressed, flat or biconvex, not scaphoid. Leaves opposite, upper sometimes alternate. Perennial herbs, occasionally woody at base.

Series 1. *Gentianoides* Boriss.—Leaves crowded in lower part of stem and in rosettes, cauline leaves rather thick, coriaceous, entire or shallow dentate, serrate or obscurely crenate; lower leaves opposite and petiolate, upper alternate and sessile. Inflorescence lax, glandular-pubescent raceme. Pedicels in fruit erect. Capsule orbicular-ovate, slightly emarginate, generally glandular-pubescent or subglabrous. Rootstock long, oblique or horizontal.

Several species described from the Caucasus (*V. imeretica*, *V. charadzeae*, *V. kemulariae*) and the Crimea (*V. ivoides*) apparently are related to the single species *V. gentianoides*.

These species are distinguished by their leaf form, pubescence, number of teeth on the leaf margin and plant size. It is very difficult to separate them, since there is a series of transitional forms, often growing together. We are maintaining the species described from the Caucasus, pending the collection of material. Material is available in the Crimea, which may help in assessing the polymorphic character of *V. gentianoides* Vahl.

1. *V. gentianoides* Vahl, Symb. bot. I (1790) 1; M.B. Fl. taur. cauc. I, 9 p.p.; III, Suppl. 10; C. Koch, Monogr. Veron. 26; Ldb. Fl. Ross. III, 247; Benth. in DC. Prodr. X, 481; Boiss. Fl. or. IV, 451, p.p.; Pflanzenfam. IV, 3b, 85 p.p.; Schmalh. Fl. II. 279; Vul'f. in Tr. Tifl. bot. sada, XV, 78; Römpf in Fedde, Repert. Beih. L, 23. p.p.; Grossh. Fl. Kavk. III, 393, p.p.; Stroh in Beih. Bot. Centralbl. LXI, 385.—*V. buxbaumiana* Pall. Plate Phys.-top. Taur. (1795) 44; in Nova Acta X (1797) 303.—*V. pallida* Hornem. Hort. Hafn. (1813) 17.—*V. pontica* Bornm. ex Römpf, l.c.; Stroh. 357 l.c. [non *V. pontica* (Rupr.) Wettst.].—*V. ivaefolia* Pall. ex Juz. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XIII (1950) 281.—*V. ivoides* Juz. l.c.—*V. gentianoides* var. *latifolia* Boiss. l.c. 452. *V. gent.* var. *pycnophylla*

Bordz. in Byull. Kiev. bot. sada V-VI (1927) 139.—*V. pycnophylla* Bordz. ex Grossh. Fl. Kavk. III (1932) 393.—*Id.*: Syreistsch. III. fl. Mosk. gub. III, 150; Tr. Bot. muz. Akad. Nauk SSSR, XXIV, fig. 1; Vestn. Tifl. bot. sada, 28, fig. 4; Juel in Acta Horti Berg. 1, 5 (1891) tab. I, f. 3; tab II, f. 31.—*Exs.*: Fl. Cauc. exs. No. 245; GRF, No. 680; Herb. Fl. Cauc. No. 190.

Perennial. Rootstock oblique or horizontal, creeping, slender, long. Plant (5)30–80(100) cm tall, with basal vegetative shoots, glandular-pubescent, glabrous or subglabrous. Stems erect or partially ascending, simple, often solitary, sometimes violet above. Radical leaves in rosettes, rather thick, generally numerous, coriaceous, lanceolate, obovate-lanceolate or suborbicular, spatulate, often up to 15 cm long, 3 cm broad, entire, shallow serrate-dentate or crenate near tip, gradually narrowed into short-winged petiole, with whitish cartilaginous margin. Cauline leaves spaced, 4–6, or numerous crowded; lower leaves opposite, upper alternate, subsessile, dentate or entire, gradually transforming into linear-lanceolate, entire, glandular-pubescent, bracts; lower leaves sometimes glabrous or all glandular-pubescent, dark green. Inflorescence terminal, racemose, lax, many-flowered, glandular-pubescent. Pedicels glandular-hairy, 2–4 times as long as bracts and calyx, or almost equaling them, erect or divergent, 3–15 mm long, elongated in fruit. Calyx 2.5–5 mm long, with 4 narrow lanceolate or oblong, almost similar, obtuse, 1–3 mm long lobes. Corolla 8–10 mm across, pale sky-blue or whitish, with dark blue stripes along whole length or in lower part, with green and hairy throat; corolla tube short; lobes obtuse, 3 orbicular, about 5 mm in diameter, 1 oblong-lanceolate, about 4 mm long, all lobes with glandular-ciliate margin, glabrous above, lateral lobes and partly middle largest lobe glandular-hairy beneath. Stamens almost equaling corolla; anthers lilac, ovoid; filaments white, erect. Style long, pale blue, gradually thickened. Ripe capsule 3–8 mm long, 3–7 mm broad, orbicular-obcordate, or elliptical, somewhat compressed, slightly emarginate, with rounded base, generally densely glandular-pubescent. Style equaling capsule or shorter. Seeds subconcave, with hilum, smooth, ellipsoid, about 1 mm long. May to August (Plate XIV, Fig. 1).

358 In damp mountain meadows, on grassy treeless slopes, along beech and pine forest edges in alpine and subalpine zones, cultivated in flower gardens, sometimes found growing wild (Moscow and Leningrad Provinces).—*European USSR*: Ladoga-IImen (Pskov, Gatchina), Upper Volga (naturalized), Crimea; *Caucasus*: Ciscaucasia, Dagestan, western, eastern and southern Transcaucasia, Talysh. *General distribution*: Balkan States-Asia Minor, Armenia-Kurdistan, Iran. Described from the Caucasus.

*Note*. A highly polymorphic plant, distributed under natural conditions from the plains to the snow line, where it is represented by a

narrow-leaved, stunted form with more dentate leaves, an always pyramidal raceme and curved or erect pedicels.

2. *V. imeretica* Kem.-Nath. in Fl. Gruz. VII (1952) 556; Zam. po Sist. i geogr. rast. Akad. Nauk GruzSSR, 18.— *Ic.*: Fl. Gruz. fig. 346.

Perennial. Rootstock vertical or oblique, simple or branched. Plant 5–10(15) cm tall, glandular-pubescent. Stem erect or partially ascending, shortened, somewhat thick. Leaves glabrous, rather thick, dry, slightly coriaceous; radical leaves in rosette, broad, obovate or suborbicular, entire or crenate-dentate towards tip, narrowed into short, broad-winged petiole; cauline leaves extremely reduced, lanceolate or narrowly obovate, sessile, few. Flowers in long terminal raceme, exceeding or equaling stem. Bracts lanceolate, much shorter than pedicels or lower bracts equaling rigid erect and glandular pedicels. Calyx much shorter than corolla, with broadly ovate to oblong-ovate, obtuse, long-ciliate, distinctly veined lobes. Corolla pale sky-blue, with violet veins. Capsule orbicular-elliptical or orbicular, glandular-pubescent or subglabrous, longer than calyx, slightly emarginate when ripe. April to May.

In foothills, damp meadows.—*Caucasus*: eastern Transcaucasia (Imeretia). Endemic. Described from environs of Satapli. Type in Tbilisi.

3. *V. kemulariae* Kuthath. in Fl. Gruz. VII (1952) 560; Zam. po sist. i geogr. rast. Akad. Nauk GruzSSR, 17, 94, 96.— *Ic.*: Fl. Gruz. fig. 348.

361 Perennial. Rootstock slender, long, horizontal or oblique, not reduced. Stem short, generally pubescent or glabrous, glandular-hairy above, erect or partially ascending, slender. Leaves crowded in radical rosette, oblong-lanceolate or oblong-obovate, gradually narrowed into petiole, with obtuse or subacute tip, margin above middle shallowly dentate, crenate or entire. Cauline leaves extremely reduced, narrow, lanceolate, sessile, dentate. Flowers in terminal, broad pyramidal, glandular-pubescent raceme. Bracts oblong-lanceolate; pedicels divergent, arcuate or almost horizontally spreading or slightly reclinate; lower pedicels 2–several times as long as bracts or calyx lobes; upper pedicels shorter or equaling them. Calyx 4-partite almost to base, with oblong-ovate or oblong-lanceolate glandular lobes. Corolla violet, sky-blue or blue, with unequal lobes. Stamens equaling corolla. Stigma clavate. Capsule slightly compressed, with rounded base, shallowly emarginate, glandular or pubescent. May to June.

On limestone in middle mountain zone.—*Caucasus*: Dagestan, western, eastern and southern Transcaucasia. Endemic. Described from western Georgia. Village of Akhali-Sopeli. Type in Tbilisi.



4. *V. charadzeae* Kem.-Nath. in Fl. Gruz. VII (1952) 559; in Zam. po sist. i geogr. rast. Akad. Nauk GruzSSR 18 (1955).—*Ic.*: Fl. Gruz. VII, Fig. 347.

Perennial. Rootstock long, oblique. Plant puberulent, 45–60 cm tall, generally darkening on drying with developed basal vegetative shoots. Stem glandular-pubescent above, with regularly spaced leaves. Leaves thin, distinctly veined, remotely dentate, puberulent on both surfaces; leaves of vegetative shoots and lower cauline 10–15 cm long, 2–3.5 cm broad, ablong-obovate, obtuse or short-pointed, gradually narrowed into long, winged petiole; middle cauline leaves generally opposite, similar to radical and with shorter petioles connate into a tube at base; uppermost leaves reduced, opposite or alternate, sessile, lanceolate or oblong-ovate. Flowers in lax terminal racemes. Bracts linear, long-pointed, or the lower ones similar to upper cauline leaves. Pedicels patent, slender, long, several times longer than calyx or 2–3 times as long as bracts, glandular-pubescent or with long white hairs. Calyx deeply 4-partite, with unequal, ovate, obtuse or subobtuse lobes, distinctly veined, with long crispate hairs. Corolla pinkish violet or sky-blue, 2 times as long as calyx, with large broad lobes. Style long, slender. Capsule laterally compressed, broadly ovate, with broad base, slightly acute sinus, reticulate, lanate. June to August.

In subalpine meadows and pine forests in upper mountain zone. *Caucasus*: Ciscaucasia, eastern Transcaucasia (Georgia, Southern Ossetia). Endemic. Described from northern Georgia, from northern slope of Skalisty Range. Type in Tbilisi.

362 5. *V. schistosa* E. Busch in Tr. Bot. muz. Akad. Nauk SSSR, XXIV (1932) 23; Grossh. Fl. Kavk. III, 393; Stroh in Beih. Bot. Centralbl. LXI, 385.—*Ic.*: Bush, l.c. fig. 1.

Perennial. Rootstock long, creeping, with aerial flowering and vegetative shoots. Flowering stems (5)8–20 cm tall, erect or partially ascending. Leaves oblong-lanceolate, acute, gradually narrowed toward base, margin serrate; upper cauline leaves sessile, oblong-lanceolate, short-pointed, erect. Racemes long, rather dense, pubescent, glandular-pubescent above. Pedicels 2–3 times as long as bracts, arcuate and divergent from peduncles. Calyx with oval or oblong, 1.5–2.5 mm and 1.5–2 mm broad lobes. Corolla bright sky-blue, with dark blue veins, short tube and broad limb. Capsule subglobose, slightly emarginate, dark, 4–5 mm long, 4.5–6 mm broad. Seeds about 1 mm in diameter, flat. Flowering June to August. Fruiting August to September (Plate XIV, Fig. 2).

On talus in high-mountain zone.—*Caucasus*: eastern Transcaucasia (Southern Ossetia), western Transcaucasia (Abkhazia). Endemic. Described from Southern Ossetia. Type in Leningrad.





Series 2. *Monticolae* Boriss.—Stem with scaly leaves at base, uniformly leafy. Leaves ovate-orbicular to oblong-lanceolate, shallow dentate-serrate and ciliate, lower leaves short-petiolate. Pedicels erectopatent, 2–4 times as long as calyx. Calyx 5-lobed. Capsule oblong-ovate, narrowed above and obtuse, not emarginate or scarcely so.

6. *V. monticola* Trautv. in Bull. Acad. Petérsb. X (1866) 398; Boiss. Fl. or. IV, 452; Wulff. in Tr. Tifl. bot. sada, XV, 83; Grossh. Fl. Kavk. III, 392; Stroh in Beih. Bot. Centralbl. LXI, 386.—*Exs.*: GRF, No. 681; Fl. Cauc. exs. No. 146.

Perennial. Plant 10–35 cm tall. Rootstock profusely branched. Stems numerous, simple, woody at base, ascending and rooting, solitary or a few together, diffuse-puberulent, with scaly brownish leaves at base. Cauline leaves oblong-ovate or lanceolate, middle leaves 1.5–3.5(5) cm long, 8–20 cm [sic] broad, acute, with cuneate base, glabrous and only sometimes hairy underneath along veins, dentate-serrate, teeth acute and shallow, margin ciliate; lower leaves short-petiolate. Racemes glandular, lax, 5–15-flowered. Pedicels slender, patent, glandular, 2–4 times as long as calyx. Bracts lanceolate, entire, shorter than pedicels, or almost equaling them. Calyx 5-lobed, sometimes 4-lobed; lobes oblong or oblong-lanceolate, obtuse, unequal; 2 lobes about 5 mm long, 2 about 4 mm and 1 about 3 mm long. Corolla 2 times as long as calyx; largest corolla lobe orbicular, sometimes emarginate: two lobes oblong-ovate and one oblong. Stamens exserted, erect, upright, 5–6 mm long. Capsule about 6 mm long, equaling calyx or 2 times as long, not compressed, oblong-ovoid, tapering above, not emarginate, puberulent and diffuse-glandular; style 10–12 mm long. Seeds numerous, 0.5–0.75 mm long, about 0.5 mm broad, ovate or elliptical, flat, slightly curved. May to June.

In alpine and subalpine zones of Glavny Caucasian Range and outlying regions, on pebble-beds and limestone, in rock crevices, on banks of rivulets.—*Caucasus*: Ciscaucasia, western and eastern Transcaucasia. Endemic. Described from Nakhar Pass in Abkhazia. Type in Leningrad.

Series 3. *Stellerianae* Boriss. Stem uniformly leafy, puberulent. Leaves sessile, opposite, ovate, with dentate or serrate margin. Inflorescence terminal corymbose or spicate raceme, dense or lax. Pedicels 3–5 times as long as flowers. Capsule elliptical, scarcely emarginate, hairy at tip.

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Plate XIV.

1. *Veronica gentianoides* Vahl, general appearance of plant, flower, seed. —2. *V. schistosa* E. Busch, general appearance of plant, flower, capsule. —3. *V. schmidtiana* Rgl., general appearance of plant, flower, capsule.

7. *V. stelleri* Pall. ex Link in Spreng., Schard. u. Link, Jahrb. III (1820) 40; C. Koch, Monogr. Veron. 32; Benth. in DC. Prodr. X, 481; Ldb. Fl. Ross. III, 247; Hultén, Fl. Kamtsch. IV, 101; Römpf in Fedde, Repert. Beih., L, 101; Komarov, Fl. Kamch. III, 68; Stroh in Beih. Bot. Centralbl. LXI, 386.—*V. yesoensis* Nakai Rep. Veg. Daisetsu (1930) 71. —*V. algida* Fisch. ex. Komarov, l.c. 69.—*l.c.*: Sugawara, Illustr. Fl. Saghal. IV, 1645, tab. 754.

Perennial. Rootstock creeping, sparingly branched. Stem 5–25 cm tall, erect, simple, partially ascending, puberulent. Leaves sessile, 4–7 pairs, connivent, opposite decussate, ovate, 1.5–3 cm long, 1–2 cm broad, generally distinctly dentate or serrate. Inflorescence terminal, at first corymbose or spicate, compact, later elongated and lax, sometimes with few flowers. Pedicels generally 3–5 times as long as flowers. Calyx with lanceolate acuminate teeth, teeth  $1/3$ – $1/2$  of calyx length. Corolla sky-blue or violet, dull, about 8 mm across. Capsule about 6 mm long, 4.5 mm broad, elliptical, scarcely emarginate, densely or very sparsely hairy at tip; style slightly shorter than capsule. Seeds ovate, about 1.5 mm long, obtuse. Flowering July to September.

On dry slopes, often in meadows in alpine zone, on moraines. *Soviet Far East*: Kamchatka (Commander Islands), Sakhalin (and Kuril Islands). *General distribution*: Beringia, Japan, North America. Described from Kamchatka. Type in Berlin.

364 Series 4. *Schmidtianae* Boriss.—Stem without trailing shoots, generally densely pilose. Leaves crowded on lower part of stem and in rosettes, pinnately or distinctly dentate-lobed. Inflorescence rather dense raceme. Pedicels several times longer than corolla and capsule. Capsule ovoid to cordate, slightly tapering above, emarginate.

8. *V. schmidtiana* Rgl. in Ind. sem. hort. Petrop. (1864) 22; Fr. Schmidt. Reise Amur. u. Sachal. (1868) 162; Römpf in Fedde, Repert. Beih. L, 25; Stroh in Beih. Bot. Centralbl. LXI, 386.—*l.c.*: Sugawara, Illustr. Fl. Saghal. IV, 1643, tab. 753.

Perennial. Rootstock slender, woody, often creeping. Stem 5–20 cm tall, solitary or a few together, erect or partially ascending, generally dense pilose with long retrorse hairs. Lower leaves up to 4 cm long, long-petiolate; upper leaves short-petiolate or sessile, Lamina 2–4 cm long, 1–1.5 cm broad, deltoid-ovate, ovate-oblong or lanceolate, margin doubly sinuate, pinnately and distinctly dentate-lobed, base truncate or subcuneate, sometimes subcordate, glabrous or somewhat pilose. Flowers in dense racemes, elongated in fruit, pedicels several times longer than corolla and capsule. Bracts in lower part of inflorescence similar to cauline leaves, upper bracts entire, lanceolate or spatulate-oblong. Flowers large. Calyx



with lanceolate or spatulate lobes, glandular,  $1/2$  or  $3/4$  as long as capsule. Corolla about 1.5 cm across, blue, sometimes white (var. *albiflora* Sugawara) or red (var. *rubescens* Sugawara); 3 corolla lobes ovate, 1 orbicular-ovate, all acute. Stamens 1.5–2.5 times as long as corolla or almost equaling it; anthers about 1 mm long, diverging. Style shorter than corolla. Capsule 6–7(10) mm long, 3–5 mm broad, slightly tapering above, with 1–2 mm long sinus, lobes divaricate at right angle; style long, almost equaling capsule; capsule chambers with about 10 seeds. Seeds about 0.5 mm in diameter, ovate, flat, with obtuse tip, acute base, smooth. Flowering June to July (Plate XIV, Fig. 3).

On stony slopes, on coastal sands.—*Soviet Far East*: Sakhalin (and Kuril Islands). *General distribution*: Japan. Described from southern Sakhalin. Type in Leningrad.

Series 5. *Serpyllifoliae* Boriss.—Stems with procumbent, decumbent and rooting, ascending shoots. Leaves sessile, orbicular and ovate to oblong and lanceolate, obscurely crenate-dentate to crenate. Racemes short, elongated in fruit, terminal ones with regularly spaced flowers. Pedicels 365 in fruit erect, equaling or 2–5 times as long as bracts. Capsule obcordate, shallow emarginate.

9. *V. serpyllifolia* L. Sp. pl. (1753) 12; M.B. Fl. taur.-cauc. I, 9; C. Koch, Monogr. Veron. 25; Benth. in DC. Prodr. V, 482; Ldb. Fl. Ross. III, 248, p.p.; Boiss. Fl. or. IV, 453; Pflanzenfam. IV, 3b, 85; Schmalh. Fl. I, 279; Wulff in Tr. Tifl. bot. sada, XV, 81; Grossh. Fl. Kavk. III, 393; Kom. and Alis. Oprod. rast. Dalnevost. kr. II, 924; Kryl. Fl. Zap. Sib. X, 2450; Stroh in Beih. Bot. Centralbl. LXI, 396.—*V. serpyllifolia* L.  $\gamma$  and  $\delta$ . C. Koch, l.c. 25.—*V. spicato-racemosa* Gilib. Fl. lith. I (1782) 107.—*V. alpestris* Schur in Verh. Sieb. Ver. Naturw. 3 (1852) 88.—*V. neglecta* F.W. Schmidt, Fl. Boem. I (1793) 20.—*V. ruderalis* Vahl, Enum. Pl. 1(1804) 66.—*V. tenella* All. Fl. Pedem. 1 (1785) 75, tab. 22, f. 1; C. Koch. l.c. 25.—*V. rotundifolia* Lucé, Fl. osil. (1823) 3.—*V. microphylla* Kit. in Oest. Fl. 2, 1 (1814) 20.—*V. fontana* Pall. ex Link, Jahrb. III (1820) 41 p.p.—*Cardia multiflora* Dulac, Fl. Hautes-Pyr. (1867) 391.—*Veronicastrum serpyllifolium* Fourr. in Ann. Soc. Linn. Lyon, N. S. XVII (1869) 128.—*Id.*: Rchb. Ic. Fl. Germ. XX, tab. 97, 1718, f. II, III; Fedtsch. and Fler. Fl. Evrop. Ross. fig. 803; Vestn. Tifl. bot. sada 28, fig. 5; Hegi, Illustr. Fl. Mittel-Eur. IV, 1, tab. 239, f. 1; Juel in Acta Horti Berg. 1, 5, tab. II, f. 33; Javorka ès Csapody, Iconogr. fl. Hung. f. 3316; Sugawara, Illustr. Fl. Sagh. IV, 1647, tab. 755.—*Exs.*: GRF, No. 1679; Hayek, Fl. Stir. exs. No. 1246; Fl. exs. Reipubl. Boh.-Slov. No. 362.



Perennial. Plant (5)10–25(40) cm tall, with vegetative or flowering shoots. Stems ascending, procumbent or decumbent, rooting, glabrous or puberulent beneath, with recurved hairs, weak, slender, branched from base. Leaves entire, puberulent or glabrous, glossy, opposite, lower leaves and those on non-flowering shoots short-petiolate or sessile, sometimes connivent in radical rosette, orbicular or ovate, obtuse, entire or obscurely crenate-dentate or crenate, 5–22 mm long, 3–10 cm [sic] broad; middle leaves spaced, sessile, oblong-ovate or oblong-lanceolate to lanceolate; upper leaves gradually transforming into bracts. Inflorescence terminal and lateral racemes, erect, many-flowered, lax, 2–20 cm long, elongated in fruit, with somewhat spaced flowers in axils of small bracts. Pedicels pubescent, erect or upcurved at acute angle in fruit, equaling or 2 times as long as bracts. Calyx with oblong-ovate, oblong and equal, obtuse lobes, glandular-ciliate, shorter than pedicels, equaling them or longer. Corolla 3–4 mm long, white, sky-blue or whitish, with pink veins, sub-rotate, slightly longer than calyx; limb with 3 subequal, obtuse, orbicular lobes and 1 ovate, smaller, obtuse lobe; tube very short, with 4 veins. Stamens almost equaling corolla, curved. Capsule broadly obovate, 3.5–4 mm long, 4–5 mm broad, compressed, rounded at base, shallowly emarginate, glandular-ciliate; style long,  $1/2$ – $3/4$  times as long as capsule. Seeds flat, scutate, ovate, about 1 mm long, numerous. May to August (September).

Plant generally of forests and meadows. Common in pastures, along roads in damp and marshy meadows, in thinly covered forests, in mountainous forest and forest-steppe regions, on grassy slopes, sometimes in steppe. Reaches altitudes of 1500–4500 m.—*European USSR*: Karelia-Lapland, Dvina-Pechora, Ladoga-Ilmen, Baltic Region, Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Trans-Volga Region, Bessarabia, Lower Don, Lower Volga; *Caucasus*: Ciscaucasia, western, eastern and southern Transcaucasia, Talysh; *Western Siberia*: Ob' Region, Altai Region; *Eastern Siberia*: Yenisey, Angara-Sayan; *Soviet Far East*: Kamchatka (?), Okhotsk, Ussuri, Sakhalin (?); *Soviet Central Asia*: Dzh.-Tarbagatai-Tien Shan, Aral-Caspian Region (northern Turkmenia). *General distribution*: Scandinavia, Central Europe, Atlantic Europe, Mediterranean Region, Balkan States-Asia Minor, Armenia-Kurdistan, Iran, India-Himalayas, Japan, China, Beringia. Described from Europe. Type in London.

10. *V. humifusa* Dickson in Trans. Linn. Soc. 2 (1794) 288; Hulten, Fl. Kamtsch. IV, 99; Stroh in Beih. Bot. Centralbl. LXI 396.—*V. serpyllifolia* auct. fl. Sib. non L.; Cham. in Linnaea, 2 (1827) 588; Ldb. Fl. Ross. III, 248 (quoad pl. Kamtsch.); Kom. Fl. Kamch. III, 69.—*V. serpyllifolia* var. *humifusa* (Dicks.) Vahl. Enum. pl. I (1805) 65.—*V. serpyllifolia* subsp. *humifusa* (Dicks.) Pennele in Monogr. Acad. Nat. Sci. Philadelph.

V (1943) 77 —*V. fontana* Pall. ex Link, Jahrb. I, 3 (1820) 41; C. Koch, Monogr. Veron. 26.—*V. serpyllifolia* var. *borealis* Laest. in Nov. Acta Soc. Ups. XI (1839) 211; Römpp in Fedde, Repert. Beih., L, 57.—*V. borealis* Laest, ex Hook. f. in Trans. Linn. Soc. 33 (1861) 336.— *Ic.*: Rchb.  *Ic.* fl. germ. XX, tab. 97, 1718, f. IV: Juel in Acta Horti Berg., No. 5 tab. II, fig. 32.

Perennial. Stems often branched from base, often with long viscid, glandular hairs in lower part. Leaves orbicular or ovate, obtuse, obscurely dentate above or entire. Pedicels glandular. Calyx shorter than corolla. Corolla dark blue, larger than that of *V. serpyllifolia* L. Capsule densely glandular, with cuneate base. In other respects, the plant is very similar to *V. serpyllifolia* L. and, possibly, is a form of this species. Sometimes found together with *V. serpyllifolia* L. Flowering June to July.

Along roadsides, near habitations, river banks, in damp places, vegetation-covered alluvial soils.—*Arctic Region*: Arctic Europe; *Soviet Far East*: Kamchatka (and Commander Islands). Okhotsk, Sakhalin. *General distribution*: Circumpolar plant. Described from Scotland. Type in Berlin.

- 367 11. *V. riederiana* Gandoger ex Herder in Bull. Soc. Nat. Mosc. 58, I (1883) 407, nomen; Kom. Fl. Kamch. III, (1930) 70; Stroh in Beih. Bot. Centralbl. LXI, 397.—*V. serpyllifolia* var. *thymifolia* Herder, l.c.

Perennial. Plant 10–15 cm tall. Stems partly ascending, partly procumbent. Leaves connivent, orbicular-ovate or oblong to lanceolate, obtuse. Racemes 1–1.5 cm long, pubescent with multicellular hairs. Pedicels slightly longer than bracts. Bracts similar to cauline leaves. Calyx with oblong, obtuse rounded lobes. Corolla light sky-blue, with lobes 2 times as long as calyx. Capsule obovate; style erect, almost equaling calyx. August.

On silty banks, near hot springs.—*Far East*: Kamchatka. *General distribution*: Beringia. Described from Kamchatka and Unalaska. Type lost.

Section 2. *Pseudolysimachia* C. Koch, Syn. fl. Germ. ed. II (1837) 527; Benth. in DC. Prodr. X, 464; Pflanzenfam. IV, 3b, 85; Vul'f in Tr. Tifl. bot. sada, XV, 71.—Gen. *Pseudolysmachion* Opiz, Seznam (1852) 80.—Inflorescence terminal, racemose or spicate, lateral clusters in axils of upper elongated leaves, with sessile or subsessile flowers. Bracts small. Calyx 4-partite. Corolla tube distinct, slightly broader than long, slightly longer or shorter than calyx and limb; corolla lobes erect or slightly recurved. Capsule suborbicular, slightly laterally compressed, obtuse or emarginate; valves united with placental column almost to tip. Seeds ovate or oblong, slightly compressed, flat or biconvex. Leaves opposite, sometimes in whorls of 3–4 or alternate. Perennials, forming numerous hybrids.

Series 1. *Longifoliae* Boriss.—Leaves opposite or in whorls of 3–4, often petiolate, sometimes a few subsessile or sessile, often with rounded or cordate base, rarely cuneate, often coarsely dentate or doubly dentate up to tip. Pedicels longer than 2 mm. Bracts shorter than pedicels. Corolla glabrous or sparsely hairy in throat. Capsule shorter than calyx or slightly longer, leaves in latter case sessile.

12. *V. longifolia* L. Sp. pl. I (1753) 10, p.p.; C. Koch, Monogr. Veron. 33 p.p; Benth. in DC. Prodr. X, 465; Ldb. Fl. Ross. III, 232; Boiss. Fl. or. IV, 455; Pflanzenfam. IV, 3b, 85; Schmalh. Fl. II, 278; Wulff in Tr. Tifl. bot. sada, XV, 74, p.p.; Grossh. Fl. Kavk. III, 394; Römpp in Fedde, Repert. Beih. L, 47; Kom. and Alis. Opred. rast. Dal'nevost. kr. II, 923; Stroh in Beih. Bot. Centralbl. LXI, 390, p.p.; Härle in Bibl. Bot. 104, 14.—*V. longifolia*  $\beta$ . and  $\gamma$ . C. Koch, l.c.—*V. longifolia* var. *puberula* Benth. l.c. 466.—*V. ruthenica* hort. ex Roem. and Schult. Syst. veg. I (1817) 96; Koch, l.c. 29.—*V. maritima* L. Sp. pl. I (1753) 10; M.B. Fl. taur.-cauc. I, 7; C. Koch, l.c. 27; Stroh, l.c. 461.—*V. verticillata* Gilib. Fl. lith. II (1781) 97.—*V. cuspidata* Pall. ex Link in Jahrb. III (1820) 36.—*V. persicifolia* Schott ex Link in Jahrb. (1821) 21.—*V. hybrida* Georgi, Besch. Russ. Reich. (1802) 256, non L. nec. M.B.—*V. media* Schrad. Comm. Veron. Spic. (1803) 23; Schmalh. Fl. II, 279.—*V. elatior* M.B. Fl. taur.-cauc. III (1819) 8, non Willd.—*V. oxyphylla* Stev. ex Besser, Enum. pl. Volh. (1821) 48.—*V. longifolia*  $\beta$ . *puberula* Benth. l.c. 466.—*V. luxurians* Ldb. Fl. alt. I (1829) 27, in adnot.; Koch. l.c. 31.—*V. pseudolongifolia* Printz, Veg. Sib.-Mong. Front. 3 (1921) 380.—*Pseudolysimachion longifolium* Opiz, Seznam (1852) 80.—*Ic.*: Ldb. Ic. Fl. Ross. tab. 211; Rchb. Ic. fl. germ. XX, tab. 93, 1714. f. I, II; Hegi, Illustr. Fl. Mittel-Eur. VI, I, f. 26a, b; Syreistsch. III. Fl. Mosk. gub. III, 151; Javorka ès Csapody, Iconogr. fl. Hung. f. 3301; Bot. mat. Gerb. Glavn. bot. sada, V, 8, fig. 2a and 26.—*Exs.*: Pl. Finl. exs. No. 916; Fl. pol. exs. No. 372 a, b; GRF, No. 933; Fl. lith. exs. No. 74.

Perennial. Rootstock long, creeping. Stem 40–120(150) cm tall, erect, strong, smooth or fissured, generally glabrous or puberulent. Leaves opposite or in whorls of 3–4, oblong or oblong-lanceolate to linear-lanceolate (var. *maritima*), 3–15 cm long, (0.5)1–4 cm broad, petiolate, generally unequal, doubly dentate or sharp serrate up to tip, with cordate, truncate or cuneate base, acuminate, glabrous or sometimes very sparsely pubescent beneath along veins. Bracts much longer than pedicels or equaling them, generally reaching tips of calyx lobes, subulate or linear. Inflorescence terminal dense raceme, elongated up to 25 cm, often solitary, sometimes with a few lateral racemes. Flowers with pedicels almost equaling calyx or shorter. Calyx about 2–3 mm long, 2/3 incised into 4 lanceolate or deltoid-oblong, acute, subequal, ciliolate lobes; two lobes slightly longer



than others. Corolla blue or bluish violet, about 6 mm long, with white tube 1/3 or 1/2 as long as corolla; tube pilose inside, with broad, flat limb; lobes obtuse or subobtuse, broad, subequal; one lobe orbicular, others oblong. Stamens generally exserted. Capsule 3–4 mm long and broad, obcordate or orbicular-ovate, inflated, hard, glabrous, retuse; style 1.5–3 times as long as capsule. Seeds oval, plano-convex, slightly curved, about 0.5 mm broad and 0.75 mm long, smooth. June to September.

Essentially a forest plant. In forest and inundated meadows. Steppe-  
369 forming areas, among bushy thickets.—*European USSR*: All regions except Crimea and extreme north. *Caucasus*: Ciscaucasia. *Western Siberia*: Ob' Region, Upper Tobol, Irtysh, Altai Region; *Eastern Siberia*: Yenisey, Lena-Kolyma, Angara-Sayan, Dauria; *Soviet Far East*: Zeya-Bureya, Uda Region, Ussuri, Sakhalin; *Soviet Central Asia*: Aral-Caspian Region, Balkhash Region, Dzh.-Tarbagatai, Tien Shan. *General distribution*: Dzh.-Kashgar (Kuldzha). Described from Europe. Type in London.

*Note*. The narrow-leaved, puberulent form, which has been recognized by several authors, is described as *V. maritima* L. Some authors have treated this form as *V. longifolia* var. *maritima* (L.) (Syreistschikov, III Fl. Mosk. gub. III (1910) 151; Pavlov in Vestn. Akad. Nauk KazSSR, 5, (1951) 42), or as var. *puberula* Denth. (DC. l.c. 466). This form is found throughout the range of the species, and is one of the numerous forms of this species.

13. *V. septentrionalis* Boriss. Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XVII (1955).—*V. longifolia* var. *borealis* Trautv. ex Middend. in Ldb. Fl. Ross. III (1847–1849) 232.

Perennial. Rootstock woody, long, roots slender, numerous. Stems 25–30 cm tall, densely leafy, somewhat thick, erect or a few together partially ascending, crispate-puberulent, with scale leaves in lower part. Leaves longer than internodes, 3–9 cm long, 1.5–4 cm broad, broadest at base; opposite, subsessile, with broad, 3–5 mm long petioles, ovate, oblong or oblong-lanceolate, coarse sharp-toothed, with acute tip, both surfaces sparsely pilose or subglabrous. Inflorescence solitary raceme, rarely branched, broad, dense, 1–10 cm long, about 2 cm broad; flowers on short, glabrous or subglabrous, about 2 mm long pedicels, 3–4 mm long in fruit. Bracts linear, glabrous, almost equaling pedicels. Calyx subglabrous, about 1.5 mm long and broad, united almost to half its length, with 4 broad, ovate, obtuse lobes. Corolla blue, about 5 mm long, with 2 mm long, 2.5 mm broad tube, hairy in throat; 3 corolla lobes ovate, 1 orbicular-ovate, obtuse. Stamens exserted; anthers about 1 mm long, diverging. Style filiform, 6 mm long, with capitate stigma. Capsule ovate, 4–5 mm long, 3 mm broad, emarginate, glabrous. Seeds flat, ovate-orbicular, 1 mm long, 0.75 mm broad. July to August (Plate XV, fig. 2).



Along banks of streams and rivers, among scrub in meadows, in tundra and forest-tundra zones.—*Arctic Region*: Arctic Europe, Arctic Siberia; *European USSR*: Karelia-Lapland, Dvina-Pechora (north); *Western Siberia*: Ob' Region (north); *Eastern Siberia*: Eniseisk Region (north), Lena-Kolyma. Endemic. Described from Cape of Nakhodka. Type in Leningrad.

14. *V. bachofenii* Heuff. in Flora, XVIII (1835) 253.—*V. biserrata*  
 370 Schur. Enum. pl. (1866) 497.—*V. media* Baumg. ex Griseb. u. Schenk  
 in Wigm. Arch. Naturg. 18 (1852) 322.—*V. grandis* Römpp. in Fedde  
 Repert. Beih. L (1928) 50, non Fisch.— *Ic.*: Rchb. Ic. fl. Germ. XX, tab.  
 90, 1711, f. II; Javorca ès Csapody, Iconogr. fl. Hung. No. 3300.— *Exs.*:  
 Fl. exs. austro-hung. No. 919.

Perennial. Plant grayish pubescent, 20–30 cm tall, patently pubescent above. Leaves opposite, petiolate, deltoid, oblong-ovate to oblong-lanceolate, with rounded-cordate base, pointed, with margins doubly sharp toothed, glabrous. Bracts linear, 2 times as long as pedicels. Racemes dense, terminal, long spiculate in bud; sometimes axillary, opposite, more lax. Calyx lobes subequal, lanceolate-linear, acute. Corolla bright blue, with tube 1/2 its length; corolla limb with 4 ovate-oblong unequal acute lobes. Stamens exserted or equaling corolla, with erect filaments and ovate anthers. Capsule orbicular, scarcely emarginate, with recurved, persistent calyx lobes; style 1.5 times as long as capsule, slender, curved. Seeds minute, flat. June to August.

On rocks, dry hills and rubbly valleys. *European USSR*: Upper Dniester (sometimes in Carpathian Range, Petros Mountain). *General distribution*: Central Europe, Balkan States—Asia Minor (Balkans Peninsula). Described from Europe. Type in Vienna;

15. *V. olgensis* Kom. in Izv. Bot. sada Akad. Nauk SSSR, XXX (1932) 209; Kom. and Alis. Opred. rast. Dal'nevost. kr. II, 923; Stroh in Beih. Bot. Centralbl. LXI, 433.

Perennial. Roots fibrous, short. Stem erect, simple, strong, 20–30 cm tall, asperate, puberulent, with crispate hairs. Leaves lanceolate or oblong-lanceolate, lower leaves deltoid, lanceolate 20–35 mm long, 4–10 mm broad, with short-cuneate base, acute, sharp serrulate or serrate-dentate, sometimes doubly serrate, with 1 cm long petioles, pilose beneath mainly along veins, sparsely hairy above. Flowers in simple raceme or inflorescence paniculate-racemose, 7–9 cm long. Lower bracts longer than pedicels and calyx, similar to cauline leaves, serrate, lanceolate; upper bracts lanceolate, entire. Pedicels about 1 mm long. Calyx sometimes reddish green, parted into 4 lanceolate-linear or lanceolate, subglabrous, subobtusate lobes almost up to base. Corolla 5 mm long, white or pink,

1/3–1/2 united in tube, hairy in throat; limb of deeper color, about 3 mm long, with erect or slightly recurved, subobtusely, subequal, oblong-lanceolate lobes. Stamens scarcely exerted; anthers oblong, about 1 mm  
 371 long, similar in color to corolla. Capsule 2–3 mm long, about 3 mm broad, scarcely longer than calyx, orbicular-cordate, somewhat compressed, 2-lobed, scarcely emarginate. Style 4 mm long. Seeds plano-convex, slightly curved on one side, ovate, 1 mm long, about 0.5–0.75 mm broad, obtuse.

On dry, rubbly slopes, in mountain oak woods. *Soviet Far East*: Ussuri. Endemic. Described from Olginsk Region (environs of the village of Chernoruchenkovo). Type in Leningrad.

16. *V. subsessilis* (Miq.) Carrière in Rev. Hort. LIII (1881) 270; Stroh in Beih. Bot. Centralbl. LXI, 392.—*V. longifolia* var. *subsessilis* Miq. in Ann. Mus. Lugd.-Bat. II (1865) 11; Sugawara, Illustr. Fl. Sahgal. IV, 1635.—*V. longifolia* var. *japonica* Maxim. ex Härle in Bibl. Bot. 104 (1932) 21.—(?) *V. miyabei* Nakai and Honda in Journ. Jap. Bot. XI (1935) 355; Sugawara, l.c.—*V. longifolia* var. *grayi* Fr. Schmidt in Mém. Ac. Sc. Pétersb. VII, 2 (1868) 162.—(?) *V. grayi* Miyabe and Kudo ex Miyabe and Miyake, Fl. Sagh. (1915) 346, non Armstrong.—*l.c.*: Curtis, Bot. Mag. tab. 6407; Carrière, l.c.; Sugawara, l.c. tab. 749.

Perennial. Stem cylindrical, erect, up to 1 m tall, crispate-hairy. Leaves generally 5–7 cm long, 3–4 cm broad, ovate to oblong-lanceolate with cordate base, sharply narrowed into 3–5 mm long petiole or sessile, coarsely dentate or serrate-dentate, acute, almost horizontally diverging from stem or reflexed, with upper surface pubescent, lower more densely so or hairy either only along veins, or subglabrous. Racemes 5–40 cm long, dense and many-flowered. Bracts filiform, long, especially in lower part of inflorescence, longer than calyx and capsule. Pedicels short or flowers subsessile. Calyx lobes linear, filiform, acute, united at base. Corolla with 4 emarginate lobes, tube 1/3; 2 lobes oblong, 2 ovate: throat hairy. Stamens exerted; anthers ovoid. Style long, filiform, 2 times as long as capsule. Capsule shorter than calyx, orbicular, slightly emarginate, glabrous. Seeds oblong-ovate, about 1 mm long, 0.5 mm broad, obtuse, plano-convex. Flowering June to July.

*Soviet Far East*: Sakhalin. *General distribution*: Japan. Described from Sakhalin. Type in Lund.

Series 2. *Grandes* Boriss.—Plants pubescent with simple hairs, intermixed with glandular hairs above. Leaves opposite, with up to 1 cm long petioles, rounded or cordate base, densely glandular-puberulent or sparsely hairy, rather deeply, unequally large-toothed. Inflorescence dense  
 372 spike; flowers on pedicels equaling or shorter than narrowly-linear bracts. Capsule orbicular or obcordate.

17. *V. dahurica* Stev. in Mém. Soc. Nat. Mosc. V (1817) 33.—*V. grandis* Fisch. ex Sprengel, Neue Entdeck. II (1821) 122; C. Koch. Monogr. Veron. 32; Benth in DC. Prodr. X. 465; Römpp in Fedde, Repert. Beih. L, 50, p.p.; Kom. and Alis. Opred. rast. Dalnevost. kr. II, 923; Stroh in Beih. Bot. Centralbl. LXI 393;—*V. longifolia* Ldb. Fl. Ross. III (1847–1849) 233, non L.—*V. longifolia* var. *grandis* (Fisch.) Turcz. in Bull. Soc. Nat. Mosc. XXIV, 2 (1851) 312.—*V. spicata* Römpp, l.c. 51, p.p.; Stroh, l.c. 394, p.p.—*lc.*: Härle in Bibl. Bot. 104, tab. B., Abb. 12.

Perennial. Roots slender, fibrous, short. Stem 30–90 cm tall, solitary or few together, erect, strong, puberulent with simple hairs, intermixed with glandular hairs above. Leaves opposite, oblong or deltoid, broadly lanceolate, 5–11 cm long, 12.5 cm at broadest part, with about 1 cm long petiole, rounded or cordate base, rather deeply, unequally large-toothed or serrate-incised, with broad teeth, densely glandular-puberulent or sparsely hairy. Flowers in terminal or lateral opposite racemes, on glandular-puberulent pedicels equaling or shorter than narrowly linear bracts. Calyx with 4 acute, linear-lanceolate, glandular-ciliate lobes, slightly shorter than capsule. Corolla about 7 mm across, white or pink, sometimes dark blue, patulous, with short tube and broad, almost regular limb with 4 ovate obtuse lobes. Stamens exserted, with large, triangular-oblong anthers, 1.5–2.5 mm long. Capsule orbicular or obcordate, in latter case with cuneate base, 2–4 mm long and 2–3 mm broad, somewhat emarginate; style 1.5–2.5 times as long as capsule. Seeds flat, obovate-orbicular, 0.75–1 mm long, 0.5–0.75 mm at broadest part above. Flowering July to August.

On sandy-pebbly sediments, on rocky slopes. *Eastern Siberia*: Dauria, Zeya-Bureya; *Soviet Far East*: Ussuri. *General distribution*: China, Japan. Described from Dauria. Type in Leningrad.

Series 3. *Sajanenses* Boriss.—Stems with scale leaves at base, densely pubescent above. Leaves opposite or whorled, sessile, scattered glandular-hairy on both surfaces. Bracts, pedicels, calyces and capsules densely pilose. Inflorescence long, dense, spicate raceme; flowers short-pedicellate. Calyx lobes linear. Corolla densely pilose in throat, with linear-cuneate lobes. Capsule orbicular or broadly ellipsoid, slightly compressed.

18. *V. sajanensis* Printz, Veg. Sib.-Mong. Front. (1921) 385; Härle in Bibl. Bot. 104, 44; Stroh in Beih. Bot. Centralbl. LXI, 395.—*lc.*: Printz, l.c. tab. 12.

Perennial. Rootstock long, woody; roots slender, numerous. Stems strong, erect, 50–70 cm tall, slightly 4-angled, densely pubescent with long, simple, articulate hairs, glandular generally in upper part. Leaves opposite or in whorls of 3, sessile, 5–7(9) cm long, 2–2.5 cm broad, oblong-lanceolate; upper leaves long tapering, sharply curved-serrate,



sometimes almost doubly serrate, base rounded, both surfaces sparsely glandular-hairy; lower leaves somewhat reduced, gradually transforming into scale leaves. Inflorescence terminal raceme, often simple, erect, 9–10 cm long, 1–1.5 cm broad, cylindrical, dense, many-flowered. Pedicels 1–1.5 mm long. Bracts linear, equaling calyx or longer; lower bracts much longer. Calyx 4-partite, lobes equal, very narrow, sublinear, 5–6 mm long, subacute, densely villous-tomentose along with pedicels and bracts. Corolla pale blue, with short tube, very deeply incised into 4 narrow, linear-cuneate lobes gradually tapering above; corolla longer than calyx or equaling it, densely pilose in throat, upper lobe with 3 veins, broadest 3 lower lobes more connate at base, distinctly single-veined. Stamens 2, sometimes up to 5, almost 2 times as long as calyx, exserted. Style equaling stamens or slightly shorter, exserted. Capsule laterally compressed, orbicular or broadly elliptical, slightly emarginate, about 3 mm long, dense pilose. Seeds about 0.75 mm long, 0.25 mm broad, ovate, convex. July.

In alpine and subalpine meadows, in lichen *tundra*.—*Western Siberia*: Altai Region; *Eastern Siberia*: Angara-Sayan (Sayan Range). Endemic. Described from Sayan.

Series 4. *Spuriae* Boriss.—Plants puberulent or subglabrous. Leaves opposite or whorled, short-petiolate, cuneate at base, sharply notched. Racemes often few, forming paniculate-racemose inflorescence. Pedicels longer than 2 mm. Bracts shorter than pedicels. Capsule longer than calyx.

19. *V. spuria* L. Sp. pl. (1753) 10; M.B. Fl. taur.-cauc. I, 6; II, 453; III, 8; C. Koch, Monogr. Veron. 28; Ldb. Fl. Ross. III, 231. p.p.; Boiss. 376 Fl. or. IV, 455; Pflanzenfam. IV, 3b, 85; Schmalh. Fl. II, 278. p.p.; Wulff in Tr. Tifl. bot. sada, XV, 76; Römpf. in Fedde, Repert. Beih. L, 48; Härle in Bibl. Bot. 104, 22; Grossh. Fl. Kavk. III, 394.—*V. brevifolia* M.B. Fl. taur.-cauc. I (1808) 6; III (1819) 8.—*V. spuria* var. *brevifolia* (M.B.) C.A.M. Verzeichn. (1831) 105.—*V. paniculata* L. Sp. pl. (1762) 18; syst. ed. X, 849; Bge. in Ldb. Fl. Alt. I, 29.—*V. paniculata* Pall. Reise I (1771) 196; Koch, l.c. 28.—*V. foliosa* Waldst. and Kit. Pl. rar. Hung. II (1805) 106, tab. 102; Stroh in Beih. Bot. Centralbl. LXI, 392.—*V. altaica* Fisch. Cat. hort. Gorenk. (1812) 19, nom. nud.—*V. leucantha* Helm in Mém. Soc. Nat. Mosc. II (1809) 106.—*V. stephaniana* Roem. and Schult. Syst. veg. I (1822) 96; C. Koch, l.c. 26.—*V. ruthenica* Fisch. ex Rchb. Fl. Germ. I (1833) 363.—*l.c.*: Rchb. Ic. fl. germ. XX, tab. 94, 1715; Bot. mat. Gerb. Glavn. bot. sada, 123, fig. 3a and 3b; Syreistsch. III. fl. Mosk. gub. III, 150; Javorka ès Csapody, Iconogr. fl. Hung. f. 3302; Helm, l.c.; Härle in Bibl. Bot. fab. A. Abb. 7.

Perennial. Rootstock creeping. Stems 30–120 cm tall, erect, branched above, densely crispate-puberulent or glabrous, cylindrical or slightly 4-angled. Leaves in whorls of 3–4 or opposite, slightly grayish due to dense





puberulence, oblong, oblong-lanceolate or narrowly lanceolate, 3–8 cm long, 1–3 cm broad, acute, sharply serrate or doubly serrate, entire in upper part, narrowed at both ends, cuneate, short-petiolate. Flowers in terminal and lateral racemes, forming paniculate-spicate inflorescence; racemes somewhat dense, with flowers somewhat regularly spaced, elongated, tapering. Bracts  $1/2$  as long as or almost equaling pedicels, narrow linear or lanceolate-linear. Calyx about 2 mm long,  $2/3$  parted into 4 ovate, oblong-ovate, subobtusate lobes. Corolla blue or sky-blue, sometimes pinkish, 5–6 mm long, tube pilose inside, limb irregular; tube rather long, longer than broad; lobes ovate, almost equaling tube, equal in width. Stamens exserted; anthers ovate. Capsule obovate or elliptical, 3–4 mm long, 2–3 mm broad, inflated, slightly compressed, retuse; style 1.5–2.5 times as long as capsule, slender, sometimes curved. Seeds flat or planoconvex, 0.5–0.75 mm long, 0.3–0.5 mm broad, ovate. June to August.

In damp and dry meadows, steppes and forest-steppes, along slopes, river banks, mixed-grass meadows.—*European USSR*: Karelia-Lapland, Dvina-Pechora, Baltic Region, Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Trans-Volga Region, Black Sea Region, Upper Dniester, Bessarabia, Crimea (?), Lower Don, Lower Volga, Urals; *Caucasus*: Ciscaucasia, Dagestan (?); *Western Siberia*: Upper Tobol, Irtysh, Altai Region; *Soviet Central Asia*: Aral-Caspian Region, Balkhash Region, Dzh.-Tarbagatai, Tien Shan. *General distribution*: Central Europe. Described from southern Europe and Siberia. Type in London.

20. *V. komarovii* Monjuschko in Bot. mat. Gerb. Glavn. bot. sada, V (1924) 114; Kom. and Alis. Opred. rast. Dalnevost. kr. II, 923; Härle in Bibl. Bot. 104, 28; Stroh in Beih. Bot. Centralbl. LXI, 393, 123.—*lc.*: Härle, l.c. tab. C., Abb. 14.

Perennial. Stems up to 1 m tall, solitary, simple or branched in inflorescence, strong, cylindrical, glabrous below, sparsely pubescent above. Leaves opposite, erect, often appressed to stem, oblong-lanceolate or broad lanceolate, 6–14 cm long, 1.5–3.5 cm broad, acute, cuneate, middle and lower leaves sessile, amplexicaul and generally connivent, serrate, rarely doubly serrate or serrulate; lower leaves entire, sparsely puberulent beneath along veins, glabrous above; upper leaves narrower, short-petiolate. Inflorescence pubescent, spicate, dense raceme, 6–30 cm long; flowers on pedicels equaling subulate bracts or slightly longer. Calyx 2–2.5 mm

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Plate XV.

1. *Veronica laeta* Kar. and Kir., upper portion of plant, corolla, capsule, seed.—2. *V. septentrionalis* Boriss., upper portion of plant, corolla, capsule, seed.—3. *V. linariifolia* Pall., upper portion of plant, corolla, capsule, seed.

long, glabrous, 1/3 parted into deltoid-lanceolate, 1-veined lobes with ciliate eglandular margin, 1/3 or 1/2 as long as capsule. Corolla about 6 mm long, sky-blue (blue), sometimes white (f. *albiflora* Hara), with short tube and broad flat limb; lobes oblong-subacute or obtuse, about 2.5 mm broad. Stamens exserted, with glabrous filaments, almost equaling style. Capsule slightly compressed, obcordate, slightly emarginate, with 1 longitudinal groove; style 12 mm long. Seeds oval, compressed. Flowering June to August.

In broad-leaved forests, among bushy undergrowth, in forest meadows and valleys. *Soviet Far East*: Zeya-Bureya, Uda Region, Ussuri, Sakhalin. *General distribution*: Manchuria, Korea, Japan. Described from Bira River. Type in Leningrad.

Series 5. *Incanae* Boriss.—Plants white-tomentose, later sometimes glabrescent, grayish green, eglandular. Leaves opposite. Racemes generally solitary; flowers sessile or on 1–2 mm long pedicels. Bracts longer than pedicels. Capsule orbicular, broadly obovate or orbicular-reniform, equaling calyx or shorter, glabrous or subglabrous. Corolla pilose in throat, with ovate lobes.

21. *V. incana* L. Sp. pl. I (1753) 10; M.B. Fl. taur.-cauc. I (1808) 7; III (1819) 9; C. Koch, Monogr. Veron. 28; Benth. in DC. Prodr. X, 466; Bge. in Ldb. Fl. alt. I, 32; Ldb. Fl. Ross. III, 235; Boiss. Fl. or. IV, 456; Pflanzenfam. IV, 3b, 85; Schmalh. Fl. II, 277; Wulff in Tr. 378 Tifl. bot. sada, XV, 75; Römpf in Fedde, Repert. Beih. L, 51; Härle in Bibl. Bot. 104, 44; Kom. and Alis. Opred. rast. Dalnevost. kr. II, 923; Sugawara, Pl. of Saghal. 278; Kryl. Fl. Zap. Sib. X, 2444; Sugawara, Illustr. Fl. Saghal. IV, 1647; Stroh in Beih. Bot. Centralbl. LXI, 395.—*V. canescens* Schrad. Comm. Veron. Spic. (1803) 19.—*V. incana* var. *canescens* (Schrad.) C. Koch, l.c. 28.—*V. neglecta* Vahl, Enum. pl. I (1805) 59, 60.—*V. incana* b. *neglecta* (Vahl) Schmalh. Fl. II (1897) 278.—*V. pallens* Host, Fl. Austr. 1 (1827) 6; C. Koch, l.c.—*l.c.*: Rchb. l.c. Fl. Germ. XX, tab. 219, 1840, f. III; Syreistsch. III. fl. Mosc. gub. III, 153; Vestn. Tifl. bot. sada, 28, fig. 3; Juel in Acta Horti Berg. 1, No. 5, tab. II, f. 24.—*Exs.*: GRF, Nos. 886, 730; Fl. pol. exs. No. 758; Fl. exs. austro-hung. No. 918.

Perennial. Rootstock ascending, branched, woody. Stems 10(20)–45(60) cm tall, erect, strong, partially ascending, simple or sparingly branched. Plant grayish or white throughout, tomentose with matted, crispate and fine hairs, rarely greenish. Leaves opposite, slightly appressed to stem, obliquely erect, ovate to oblong and lanceolate-oblong, 1.5–10 cm long, 0.5–2 cm broad, entire above, remaining margin obscurely crenulate or subdentate, base cuneate; lower leaves connivent, rosettelike (leaves often persisting in winter), ovate to oblong, with up to 2.5 mm long petioles,



crenulate-denticulate margin and obtuse or rounded apex; upper leaves oblong-lanceolate to lanceolate, with about 1 cm long petiole, subacute, subentire or entire; uppermost leaves sessile, reduced; all leaves white-tomentose on both surfaces or sometimes green above, rarely sparsely pubescent and greenish on both surfaces [var. *neglecta* (Vahl) Schmalh.]. Inflorescence terminal raceme, simple, rarely with 2 lateral branches, spicate, dense, 3–10(30) cm long, 1.2–1.5(2) cm broad, sometimes interrupted at base. Bracts lanceolate-linear or upper ones subulate, 2 times as long as pedicels, equaling or exceeding calyx, white-tomentose, eglandular. Flowers subsessile or on short pedicels, much shorter than calyx. Calyx 3–4 mm long, deeply incised into 4 unequal ovate-oblong or lanceolate subobtusate lobes, white-tomentose or gray-pubescent throughout. Corolla 4–7 mm across, rotate, blue, rarely white, almost 3 times as long as calyx, with broad tube, hairy inside, 1/2 as long as limb; corolla lobes subacute or acute, irregular, oblong-ovate to ovate (2 lateral ones) and broad ovate. Stamens erect, somewhat exserted; anthers about 1–2 mm long, ovoid. Capsule orbicular, ovate or orbicular reniform, (3)3–5(4) mm long and broad, with rounded or short-cuneate base, apically dehiscent, narrowly emarginate, puberulent, glabrous or subglabrous; style 1.5–3 times as long as capsule. Seeds 0.75 mm long, 0.5 mm broad, ovate, plano-convex or flat. May to August.

On stony and steppe slopes, rocks, in dry pine forests, sometimes in alkaline meadows; in subalpine and alpine zones, on limestone and marl slopes and dry riverbeds.—*Arctic Region*: Anadyr (rare). *European USSR*: all regions except extreme north; *Western Siberia*: Upper Tobol, Irtysh, Altai Region; *Eastern Siberia*: Angara-Sayan, Dauria, Lena-Kolyma, Yenisey; *Soviet Central Asia*: Aral-Caspian Region, Balkhash Region, Dzh.-Tarbagatai, *General distribution*: Central Europe, Atlantic Europe, Korea, Japan. Described from Southern Russia. Type in London.

*Note*. Hybrids with *V. spicata* (for example, along the Oka River in the Moscow suburbs) are often reported in the northern parts of the range of *V. incana*. Hybrids between *V. incana* and *V. dahurica* are reported from Trans-Baikal Region.

22. *V. bellidifolia* Juz. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XIII (1950) 297, non *V. spicata*  $\beta$ . *bellidifolia* Wallroth, Sched. crit. (1822) 5, non *V. bellidifolia* Römpp in Fedde, Repert. Beih. L., (1928) 3.—*V. incana* Turcz. in Bull. Soc. Nat. Mosc. (1851) 313, non L.

Perennial. Rootstock long, branched. Plant 10–15(30) cm tall. Stem partially ascending, numerous, dense tomentose, slender. Cauline leaves opposite, mainly linear and linear-lanceolate, 1–5 cm long, 3–5 mm broad, erect, gradually narrowed toward base, sessile, or with 2–8(10) mm long petioles, subacute, entire; lower leaves spatulate, with longer petioles,



cuneate, obtuse; leaves on vegetative shoots crowded, with about 10 mm long petioles; all leaves tomentose, sometimes less pubescent above. Inflorescence spicate raceme, 2–6 cm long, about 1 cm broad, dense or somewhat lax, sometimes interrupted in lower part, elongated and tapering in bud. Pedicels about 0.5 mm long, or flowers subsessile, elongated in fruit up to 2–3 mm. Bracts subulate, 3–4 mm long, lower bracts 7 mm long, slightly longer than calyx or as long as pedicel and calyx together, tomentose. Calyx 2–2.5 mm long, with short oblong or ovate lobes, tomentose outside, glabrous inside. Corolla 3–4 mm long, with 3 ovate and 1 oblong, subobtuse lobes; tube pilose inside, about 2 mm long. Stamens long exserted. Style exserted, 2–3 times as long as calyx. Capsule ovate, scarcely longer than calyx, acute, finely glandular-puberulent, with persistent curved style, nearly 2 times as long as capsule. Seeds about 1 mm long, 0.5 mm broad, ovate, obtuse. Flowering June to July.

In steppes, and sandy and rubbly areas, on mountain slopes, among rocks and debris.—*Eastern Siberia*: Angara-Sayan, Dauria. *General distribution*: possibly in areas adjoining Mongolia. Described from vicinity of Krasnoyarsk. Type in Leningrad.

*Note.* The forms most characteristic for Eastern Siberia are found in the vicinity of Lake Shiro (Minusinsk District) along the shores of Baikal, in the Tuva Region. The narrow-leaved, many-stemmed forms of *V. incana* s. i. similar to those of the Trans-Baikal Region are observed on the sandy beds of the Don River. *V. bellidifolia* Juz., possibly, is the same as *V. incana* L. s. s.

23. *V. hololeuca* Juz. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XIII (1950) 298.—*V. incana* M.B. Fl. taur.-cauc. I (1808) 7; Ldb. Fl. Ross. III, 235 (quoad pl. taur.); Boiss. Fl. or. IV (1879) 456. p.p. and auct. omn. Fl. taur.

Perennial. Rootstock oblique, woody. Stem 10–25(30) cm tall, strong, partially ascending below, densely tomentose with white crispate hairs. Leaves 1.5–6 cm long, 8–20 mm broad; lower leaves connivent on short shoots, with broad, 1–2.5 cm long petioles, ovate or oblong, crenulate-denticulate; upper leaves with 0.5–1 cm long petioles, the uppermost sessile, reduced; cauline leaves oblong to lanceolate, cuneate, acute, white-tomentose on both surfaces. Inflorescence terminal raceme, 3–10 cm long, 1.3–2 cm broad, compact, sometimes interrupted at base; flowers on short, tomentose pedicels, upper subsessile. Bracts lanceolate or linear, white-tomentose along with calyx. Calyx equaling or exceeding bracts, 3–5 mm long, with 4 unequal, ovate-oblong to lanceolate, obtuse lobes. Corolla up to 9 mm across, blue, with broad, 2–3 mm long tube; limb with 4 unequal, subacute lobes. Stamens about 8 mm long, with thick filaments and orbicular-ovate, 1.2 mm long anthers. Style not exserted. Capsule shorter

than calyx, orbicular-reniform, emarginate, glabrous or subglabrous. June to August.

Stony slopes and rocks, along beech forest edges, on high plateaus, dry stony riverbeds. *European USSR*: Crimea (Chatyrdag and Karabi-yaila mountains). Endemic. Described from Crimea. Type in Leningrad.

*Note.* Very similar forms are reported from Kirovograd (Ukraine).

*Series 6. Spicatae* Boriss.—Plants subglabrous or somewhat puberulent or greenish, with somewhat rigid, patent hairs, glandular-hairy, sometimes only intermixed with glandular hairs. Leaves opposite, sometimes alternate above, crenulate or obscurely crenate, entire at tip. Racemes often 381 simple; flowers sessile or short-pedicellate. Bracts longer than pedicels. Capsule obovate or orbicular. Corolla lobes subacute.

24. *V. spicata* L. Sp. pl. I (1753) 10; M.B. Fl. taur.-cauc. I, 8; C. Koch, Monogr. Veron. 26; Benth in DC. Prodr. X, 466; Ldb. Fl. Ross. III, 233, p.p.; Boiss. Fl. or. IV, 455, p.p.; Pflanzenfam. IV, 3b, 85; Schmalh. Fl. II. 278; Wulff in Tr. Tifl. bot. sada, XV, 71; Römpf in Fedde, Repert. Beih. L, 50, p.p.; Härle in Bibl. Bot. 104, 30, s. 1.; Grossh. Fl. Kavk. III, 393; Kryl. Fl. Zap. Sib. X, 2441; Stroh in Beih. Bot. Centralbl. LXI, 394.—*V. spicata*  $\alpha$ . *vulgaris* Koch, Syn. fl. Germ. (1838) 528;  $\beta$ . *latifolia* Koch, l.c.; var. *lancifolia* Koch, l.c.—*V. spicata*  $\delta$ . l. Koch, Monogr. Veron. (1833) 27.—*V. hybrida* L. Sp. pl. I (1753) 10.—*V. galeopsifolia* Gilib. Fl. lith. I (1782) 104.—*V. oppositifolia* Gilib. Exercit. phyt. I (1792) 110.—*V. nitens* Host, Fl. Austr. I (1827) 7; C. Koch, l.c. 29.—*V. sessilifolia* Opiz, Nat. 9 (1824) 110.—*V. menthaefolia* Schott. in Roem. and Schult, Syst. veg. I (1817) 34.—*V. psilophylla* Nevski ex Kryl. Fl. Zap. Sib. X (1939) 2442.—*V. australis* Schrad, Comm.-Veron. Spic. (1803) 15; C. Koch, l.c. 31.—*V. longebracteata* Link, Enum. berl. I (1821) 20.—*Pseudolysimachion spicatum* Opiz, Seznam (1852) 80.—*Cardia spicata* Dulac, Fl. Hautes-Pyr. (1867) 392.—*Hedystachys spicata* Fourr. in Ann. Soc. Linn. Lyon, N. S. XVII (1869) 128.—*l.c.*: Rchb. Ic. fl. Germ. XX, tab. 92, 1713, f. 1; Fedtsch. and Fler. Fl. Evrop. berl. fig. 801; Syreistsch. Ill. fl. Mosk. gub. III, 152; Vestn. Tifl. bot. sada, 28, fig. 2; Javorka ès Csapody, Iconogr. fl. Hung. f. 3307; Juel in Acta Horti Berg. 1, No. 5, tab. II, f. 25.—*Exs.*: GRF, No. 578; Pl. Finl. exs. No. 2078; Fl. pol. exs. No. 60.

Perennial. Rootstock slender, horizontal. Stems (10)15–50(75) cm tall, single or a few together, erect or ascending, strong, simple, grayish due to pubescence or green, sometimes glabrous in lower part, densely covered with short patent hairs, sometimes intermixed with glandular hairs, mainly on bracts, peduncles and calyx. Leaves 1.5–8.5 cm long, 0.3–3 cm broad, opposite, upper leaves alternate, sometimes lanceolate to linear; lower leaves oblong to ovate-orbicular, petiolate, with cuneate, rarely rounded

base, obtuse, with short-dentate-serrate margin or crenate, with pointed entire tip; upper leaves sessile, crenate or entire, subacute. Bracts linear-subulate, almost equaling calyx, glandular-hairy. Inflorescence terminal, simple, dense raceme 5–30 cm long, sometimes lateral racemes in upper leaf axils; all racemes tapering upward. Pedicels villous or glandular-villous, generally shorter than calyx or flowers subsessile. Calyx ciliate, with 4 unequal, oblong, lanceolate lobes. Corolla bright sky-blue or blue, sometimes pink, violet or white, 6–7 mm long, with 4 patent, lanceolate lobes of unequal width, parted up to 2/3; corolla tube pilose inside, about 2 mm long. Stamens equaling or shorter than corolla, erect; anthers ovate. Capsule obovate or orbicular, bilobed, obtuse, 2–4 mm long and broad, retuse, sparsely pubescent with simple and glandular hairs, shorter than or equaling calyx; style 1.5–2 times as long as capsule. Seeds plano-convex, about 0.75 mm long, 0.5 mm broad, broad ovate, obtuse, smooth. June to October.

In pine forests and steppes, rarely in high-mountain zone, on rubbly slopes, in forest glades. *European USSR*: Dvina-Pechora, Baltic Region, Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Trans-Volga Region, Upper Dniester, Bessarabia, Black Sea Region, Crimea, Lower Don, Lower Volga; *Caucasus*: Ciscaucasia, eastern Transcaucasia; *Western Siberia*: Altai Region, Upper Tobol; *Eastern Siberia*: Yenisei; *Soviet Central Asia*: Aral-Caspian Region, Balkhash Region, Dzh.-Tarbagatai, Tien Shan. *General distribution*: Scandinavia, Central Europe, Atlantic Europe, Mediterranean Region, Dzh.-Kashgar (?). Described from Northern Europe. Type on London.

*Note*. In the Southern Urals, the narrow- and sharp-leaved form with a short, narrow inflorescence is common. The hybrid *V. spicata* × *V. longifolia* (Schmalh. Fl. II, 278) has been observed.

25. *V. Porphyriana* Pavl. in Vestn. Akad. Nauk KazSSR, 4 (1951) 92; 6, 42.—*V. spicata* var. *viscosissima* Kar. and Kir. in Bull. Soc. Nat. Mosc. XIV (1841) 721; Kryl. Fl. Zap. Sib. X, 2442.—*V. krylovii* Pavl. in sched. non Schischk. (1939).—*V. viscosa* Pall. ex Link, Jahrb. 3 (1820) 34.—*V. glandulifera* Opiz, Nat. (1825) 110.—*V. euxina* Turill in Journ. Bot. LXIII (1925) 161, p.p.; Kryl. l.c.; Stroh in Beih. Bot. Centralbl. LXI, 395.—*V. spicata* d) *V. euxina* Turill ex Härle in Bibl. Bot. 104 (1932) 40 p.p. —*l.c.*: Pavl. l.c. 4, fig. 25.

Perennial. Rootstock rather long, creeping, woody, 5–8 cm long, 2–3 mm broad; roots slender, numerous. Plant dark green, dense glandular-pubescent, viscid. Stem often single, simple, 15–35 cm tall, densely covered with patent, glandular hairs. Leaves opposite, sometimes upper leaves alternate; lower leaves connivent, petiolate; petioles 1–2.5 cm long; middle and upper cauline leaves sessile, broadly elliptical or oblong-ovate, 3–6 cm



long, 1.5–2 cm broad, cuneate, subobtusate, with crenate-dentate margin, glandular-pubescent, densely beneath and diffuse on upper surface; upper leaves lanceolate, pointed. Racemes terminal, spicate, dense, compact, somewhat thick, 4–15 cm long, 1.5–2 cm broad, after flowering obtuse or short-pointed, often simple; flowers sessile or subsessile with very short pedicels. Bracts narrowly lanceolate, 1.5 times as long as pedicels and calyx, densely glandular-hairy. Calyx parted almost up to base into lanceolate, acuminate, densely glandular-pubescent lobes, 3.5–4 mm long, with long-ciliate margin. Corolla deep blue, 8–10 mm long, parted up to 2/3 into 4 oblong-lanceolate, equal or subequal, acute lobes; corolla tube 1/3 of corolla length, pilose inside. Stamens included; anthers bluish. Capsule 3–3.5 mm long, obovate, retuse above, densely glandular-pubescent. July to August.

In subalpine zone. *Western Siberia*: Altai Region; *Soviet Central Asia*: Dzh.-Tarbagatai, Tien Shan. *General distribution*: (?) Dzh.- Kashgar. Described from Trans-Ili Ala-Tau. Type on Alma-Ata.

26. *V. barrelieri* Schult. in Röm. and Schult. Syst. veg. I (1817) 94; Stroh in Beih. Bot. Centralbl. LXI, 395.—*V. hybrida* M.B. Fl. taur.-cauc. I (1808) 8; III (1819) 9, non L.; Stroh, l.c. 395.—*V. spicata*  $\beta$ . and  $\gamma$ . C. Koch, Monogr. Veron. (1833) 27.—*V. spicata*  $\delta$ . *setulosa* Koch, Syn. fl. Germ. I (1838) 528; Ldb. Fl. Ross. III, 234;  $\epsilon$ . *cristata* Koch, l.c. p.p.—*V. spicata*  $\beta$ . *hybrida* Koch, in Linnaea, XXII–XXIV (1848) 688.—*V. spicata* b. *barrelieri* (Schult.) Schmalh. Fl. II (1897) 278; Härle in Bibl. Bot. 104, 31.—*V. sp. ssp. transcaucasica* Bordz. in Byull. Kievsk. bot. sada V–VI (1927) 138. —*V. andrashovskyi* Jav. in Bot. Közl. 19 (1920) 26.—*V. setulosa* Koch, Syn. I (1838) 528.—*V. transcaucasica* Bordz. ex Grossh. Fl. Kavk. III (1932) 393; Stroh, l.c. 395.—*V. steppacea* Kotov in Tr. Sil'sk.-gosp. bot. 1, 3 (1927) 33, nomen; Bot. Zhurn. Akad. Nauk URSS, vol. XI, 3, 80.—*l.c.*: Javorka és Csapody, Iconogr. fl. Hung. f. 3306; Härle, l.c. tab. XIV; Syreitsch. III. fl. Mosk. gub. III, 152.

Perennial. Stem suberect or ascending, 20–50 cm tall, simple, gray-pubescent with patent, eglandular, long, articulate hairs, especially in upper part, subglabrous below. Leaves broad, 1–6.5 cm long, up to 2 cm broad, oblong-ovate to lanceolate; lower leaves ovate, subobtusate, with cordate or cuneate base, with short winged petioles, or upper leaves subsessile, with unequally serrate-dentate margin, pubescent on both surfaces. narrower, with entire tip. Inflorescence terminal, 5–20 cm long, many-flowered, dense, spicate raceme, lateral racemes appearing sometimes in axils of upper opposite leaves. Bracts linear-lanceolate, lower ones exceeding flowers, upper scarcely equaling calyx, with long-ciliate margin. Flowers subsessile or on short pedicels, 1/2 as long as calyx. Calyx 4-partite, 2–4 cm long, with lanceolate lobes with long-ciliate margin; upper lobes



shorter. Corolla blue, 7–8 mm long, with short, erect, smooth tube, hairy in throat; limb longer than tube, with 4 erect, oblong-lanceolate, subobtusely or subacute lobes; upper lobe broader, ovate-oblong, acute, erect; lower 3 lobes spreading, divergent, subacute or obtuse. Stamens exserted, erect, with ovate anthers, shorter than style. Stigma slightly thickened. Capsule orbicular, slightly compressed, about 2–2.5 cm in diameter, glabrous, slightly exceeding calyx. Seeds planoconvex, minute, smooth, ovate. June to August.

Dry slopes, stony areas and slopes on granite of foothills.—*European USSR*: Bessarabia, Black Sea Region, Crimea, Lower Don; *Caucasus*: Eastern and Southern Caucasus. *General distribution*: Mediterranean Region, Balkan States-Asia Minor. Described from Europe. Type in Berlin.

*Note*. N.I. Kusnezow reports f. *buschii* Kusnez. (*V. orchides* var. *buschii* (Kusnez.) Troitzky), with yellow flowers and linear-lanceolate lobes—from Georgia.

27. *V. orchidea* Crantz, Stirp. Austr. ed. 2, f. IV (1767) 333; Roem. and Schult. Syst. veg. I, 94; C.A.M. Verzeichn. 105; C. Koch, Monogr. Veron. 28; Boiss. Fl. or. IV, 455; Pflanzenfam. IV, 3b, 85; Härle in Bibl. Bot. 104, 38; Stroh in Beih. Bot. Centralbl. LXI, 395; Grossh. Opred. rast Kavk. 315.—*V. spicata* var. *orchidea* (Crantz) Schmalh. Fl. II (1879) 278; Fedtsch. and Fler. Fl. Evrop. Ross. (1910) 860.—*V. spicata* ssp. *carpatica* Dostal, Kvetena CSR (1950) 1305.—*V. cristata* Bernh. Ehrenpreiss. (1806) 14.—*V. spicata* var. *cristata* Bernh. l.c.; Koch, Syn. fl. Germ., 528; Ldb. Fl. Ross. III, 234.—*Pseudolysimachion cristatum* Opiz in Lotos, IV (1854) 45.—*l.c.*: Rchb. l.c. fl. Germ. tab. 92, 1713, f. II; Javorka és Csapody, Iconogr. fl. Hung. f. 3308; Syreistsch. III. fl. Mosk. gub. III, 152.—*Exs.*: Fl. Stir. exs. No. 1045; Fl. exs. austro-hung. No. 156 and No. 155; Fl. exs. Reipubl. Boh.-Slov. No. 880; Fl. Hung. exs. No. 457.

Perennial. Rootstock somewhat slender, woody, with numerous fibrous roots. Plant 30–60 cm tall. Stem erect, simple, rarely branched, glabrous in lower part, glandular-pubescent above, with patent, soft-gray tomentum, dry stems blackening. Leaves opposite, lower ones petiolate, oblong-ovate, or ovate obtuse; upper cauline leaves oval to lanceolate, sessile or short-petiolate, subacute or subobtusely, upper surface shining, glabrous beneath, margin serrulate or crenate-dentate, entire at tip; floral leaves subsessile. Inflorescence long terminal raceme, simple or 3–5-branched, appearing from upper leaf axils. Lower bracts exceeding flowers, upper nearly equaling calyx. Flowers subsessile. Pedicels much shorter than calyx. Calyx pubescent with mainly glandular hairs, lobes ovate, shorter than corolla. Corolla pale blue, blackening when dry, with linear, pointed, connivent lobes, twisted in lower part, throat pilose inside. Stamens included; anthers ovoid, about 1.5 mm long. Capsule patently

pilose, extremely glandular, orbicular, hard, with small sinus. Seeds planoconvex, oblong, 0.75 mm long, 0.3 mm broad. May to September.

On dry slopes of foothills and mountains, up to subalpine zone, in steppes and forest-steppes, less often in open forests. *European USSR*: Upper Dniester, Upper Dnieper, Middle Dnieper, Volga-Don, Bessarabia, Black Sea Region, Lower Don; *Caucasus*: Ciscaucasia, Dagestan, western Transcaucasia. *General distribution*: Central Europe, Balkan States-Asia Minor. Described from Western Europe. Type in Vienna.

Series 7. *Alatavicae* Boriss.—Plants grayish due to fine crispate hairs or greenish. Leaves opposite, short-petiolate, with large-toothed margin. Inflorescence elongated raceme, sometimes spicate-paniculate. Pedicels short. Bracts linear, exceeding pedicels and calyx. Capsule pubescent at tip, orbicular-obovate. Corolla white, yellow when dry.

28. *V. alatavica* M. Pop. in Byull. Mosk. obsch. isp. prir. XVII (1938) 87; Pavl. in Vestn. Akad. Nauk KazSSR 6, 42.

Perennial. Rootstock branched, large, woody. Stems generally numerous, partially ascending, erect, 30–50 cm tall, cylindrical, simple or very rarely branched, grayish due to fine crispate hairs. Leaves opposite, petiolate, petioles about 0.5 mm long, upper surface pubescent with short, crispate hairs, densely so beneath or subglabrous, oblong-lanceolate or oblong, cuneate, acute or acuminate, with coarsely dentate or serrate margin, 3–5 cm long, 0.8–2 cm broad; upper leaves smaller; reduced shoots with few small leaves appearing in leaf axils. Inflorescence spicate, elongated raceme, 4–15 cm long, dense and cylindrical, generally simple and terminal; sometimes lateral racemes appearing in leaf axils along with terminal raceme, forming almost paniculate inflorescence, similar to that of *V. spuria* and *V. longifolia*, raceme sometimes interrupted at base. Bracts linear, exceeding pedicels, longer than calyx, pubescent. Flowers on short, puberulent pedicels shorter than calyx and bracts, or sessile. Calyx 4-partite, 1/4–1/3 united at base, with 3 linear and 1 lanceolate, 2–3 mm long lobes, acute, short-crispate and short-ciliate along margin. Corolla white (yellow when dry), about 5 mm long, almost 1/2 its length united into tube, pilose inside; corolla lobes spreading, posterior lobes oblong-lanceolate, anterior lanceolate-linear, subobtusate or subacute. Stamens exserted; anthers orbicular, slightly diverging at base. Style filiform, shorter or longer than corolla, with scattered white hairs throughout. Stigma capitellate. Ovary oblong, hairy at tip. Capsule orbicular-obovate, inflated, about 3 mm long, pubescent at tip, with obscure groove; style exceeding capsule. Seeds (?). July to August.

On dry steppe slopes at 2500–2600 m.—*Central Asia*: Tien Shan. Endemic. Described from Trans-Ili Ala-Tau. Type in Alma-Ata.

Series 8. *Pinnatae* Boriss.—Plants glandular-pubescent, gray-pubescent or glabrous. Leaves alternate, rarely opposite, narrowly linear to linear-lanceolate and oblong, pinnatipartite or entire, dentate or smooth-edged. Inflorescence often simple, dense, spicate raceme, sometimes lateral racemes present. Flowers sessile or pedicellate, equaling or exceeding calyx. Capsule orbicular-reniform to oblong-ovate.

29. *V. linariifolia* Pall. ex Link, Jahrb. 3 (1820) 35; C. Koch, Monogr. Veron. 27; Härle in Bibl. Bot. 104, 25; Turcz. Cat. baic.-dah. No. 869; Kom and Alis. Opred. rast. Dalnevost. kr. II, 923; Stroh in Beih. Bot. Centralbl. LXI, 392.—*V. spuria* auct. p.p.: Römpf in Fedde, Repert. Beih. L, 48; Härle, l.c. 1.—*V. spuria*  $\beta$ . Ldb. Fl. Ross. III (1847–1849) 231.—*V. angustifolia* Fisch. Cat. hort. Gorenk. (1812) 9, nom. nudum, non Bernhardi (1806) nec S.F. Gray (1821); Link, Enum. I, 19.—*V. cartilaginea* Ldb. Fl. alt. I (1829) 28; C. Koch, l.c. 28;—*V. incisa* Schrad. in Ait. Hort. Kew. I (1789) 19.—*V. rubicunda* Ldb. l.c.; C. Koch, l.c. 29.—*V. rubella* Pall. ex Link, Jahrb. 3 (1820) 38.—*V. serrulata* Pall. ex Link, l.c. 38; C. Koch, l.c. 26.—*V. galactites* Hance in Ann. Sc. Nat. 5, 5 (1866) 232.—*V. paniculata*  $\beta$ . *angustifolia* Benth. in DC. Prodr. (1846) 465, p.p.—*V. paniculata* Miq. in Ann. Mus. Lugd-Bat. II (1865) 119.—*V. spuria* var. *angustifolia* Makino in Tokyo Bot. Mag. X (1896) 252; XIII (1899) 112.—*Veronicastrum laciniatum* Moench, Meth. pl. Suppl. (1802) 158.—*Veronicastrum incisum* Moench, l.c. 158 p.p.—*l.c.*: Ldb. Ic. Fl. Ross. III, I, tab. 208, 210.

Perennial. Roots slender, numerous, fibrous, short. Stem erect or partially ascending, slender, 25–50 cm tall, hirsute with short, antrorse hairs. Leaves opposite or alternate, narrowly linear or lanceolate-linear, sometimes lanceolate, green, serrulate or denticulate, with entire cuneate base, with 5–10(15) mm long petioles; terminal leaves acute or subacute, 2.5–6 cm long, 2–10(20) mm broad, puberulent or subglabrous, with scattered hairs on midrib, mainly at base. Raceme long, dense, 7–25(40) cm long, 1.5–2 cm broad, terminal, simple or rarely branched. Bracts narrow, 4–5 mm long. Pedicels slender, 2–5 mm long, with short, rigid hairs; flowers numerous, lower ones spaced. Calyx 3–4 mm long, with subacute, lanceolate lobes united at base, subglabrous, with short-ciliate margin. Corolla blue, reddish, white or light lilac, 5–7 mm long, pilose in throat, with 1.5–2 mm long broad tube; limb with 3 obtuse, ovate and 1 orbicular lobes. Stamens exserted, with oblong, diverging anthers, 1.5 mm long. Style long, about 7 mm, filiform, with small capitate stigma. Capsule orbicular-reniform, about 3 mm long, 4 mm broad, glabrous, slightly notched at tip, with persistent, curved, long style. Seeds 0.75–1 mm long, 0.5–0.75 mm broad, orbicular-ovate, planoconvex, smooth, dorsally keeled. June to August. (Plate XV, fig. 3).



In forest meadows, short-grass meadows, shrubby undergrowths, sometimes in steppes, pine forests, also on dry slopes.—*Eastern Siberia*: Angara-Sayan, Dauria, Lena-Kolyma (Vitim and Mui river basins); *Soviet Far East*: Zeya-Bureya, Uda Region, Ussuri. *General distribution*: Mongolia, China, Japan. Described from Dauria. Type in Berlin.

*Note*. Plants with broadly lanceolate leaves, densely pubescent stems and petioles, and large flowers (var. *balicalensis* Boriss.) are found near Lake Baikal (Kultuk).

30. *V. laeta* Kar. and Kir. in Bull. Soc. Nat. Mosc. XV (1842) 414; Benth. in DC. Prodr. X, 464; Ldb. Fl. Ross. III, 230; Römpf in Fedde, Rept. Beih. L, 49; Härle in Bibl. Bot. 104 (1932) 30; Kryl. Fl. Zap. Sib. X, 445; Stroh in Beih. Bot. Centralbl. LXI, 394.— *Ic.*: Härle, l.c. tab. C.— *Exs.*: HFAM, No. 165; Ed. Hort. bot. Petrop. No. 48.

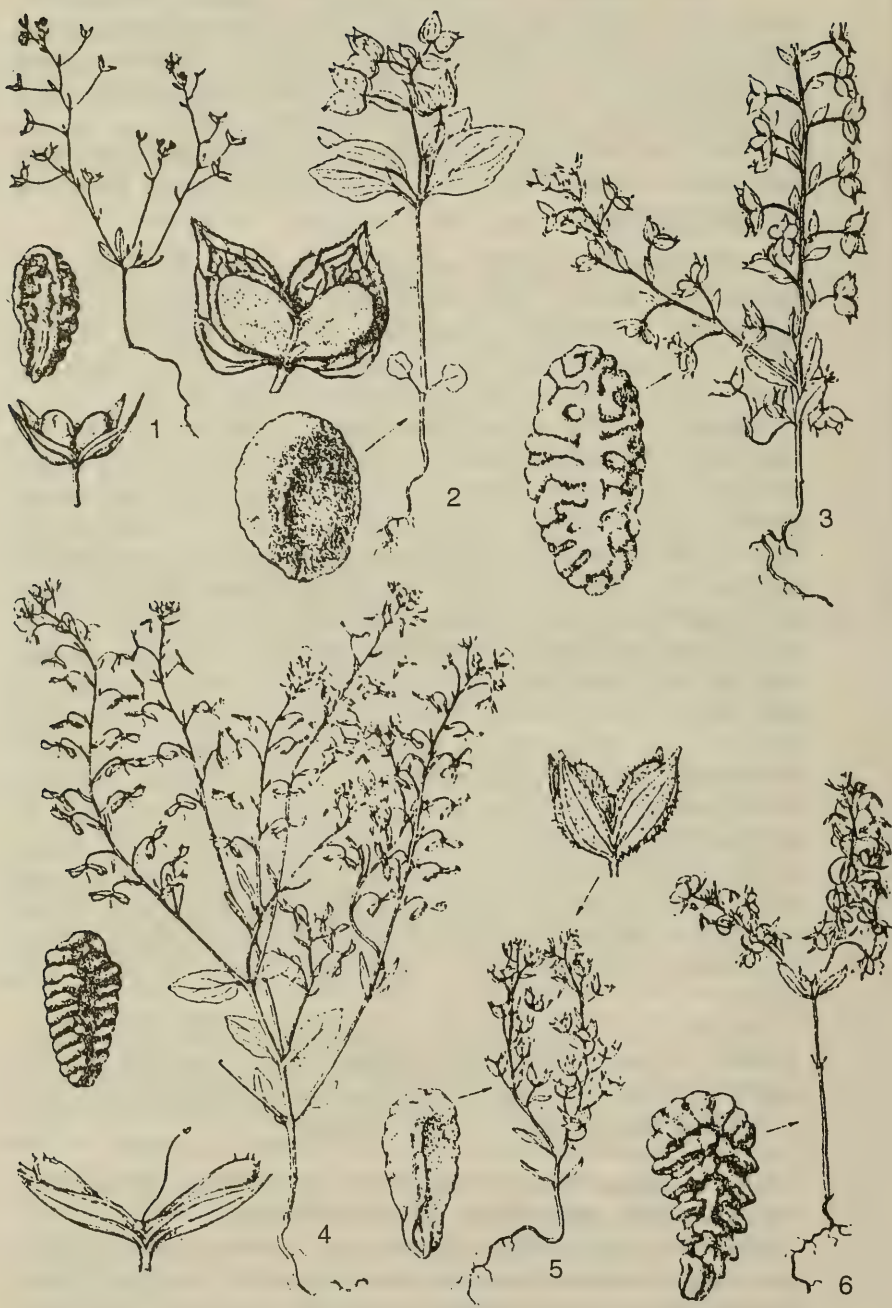
Perennial. Rootstock thick, multi-headed, woody. Stems numerous, erect, simple, sometimes branched, (15)25–55(100) cm tall, woody at base, sometimes rather densely covered with very short, appressed hairs, or subglabrous. Leaves alternate or a few connivent, generally slightly curved, linear to oblong-lanceolate, 1–5 cm long, 0.5–4 mm broad; sometimes all leaves or often lower ones with narrow, unequal, coarse teeth; sometimes  
390 all or upper leaves entire and linear, narrowed into short petiole sparsely covered with short hairs or subglabrous. Inflorescence terminal raceme, 4–20 cm long; sometimes short lateral racemes appearing in upper leaf axils. Pedicels 1.5–2 mm long. Bracts linear, entire. Calyx 1–3 mm long, 1/2 parted into oblong-ovate or lanceolate, acute, unequal 4 lobes with short-ciliate, sometimes glandular-ciliate margin. Corolla blue, whitish or lilac-colored, 2.5–6 mm across, with irregular limb, tube densely pilose inside, almost equaling limb. Stamens twice as long as corolla limb; anthers oblong. Capsule obovate or orbicular, not compressed, 3–5 mm long and broad, 2 times as long as calyx, very shallow sinus with narrow cuneate notch at base, glabrous, smooth; Style long, 2–3 times as long as capsule. Seeds oblong, 1.5–2 mm long, 0.5–1 mm broad. June to July. (Plate XV, fig. 1).

On stony slopes, in rocky places, steppes, sandy areas, from foothills to 2400 m.—*Soviet Central Asia*: Balkhash Region, Tien Shan (western side), Dzh.-Tarbagatai. *General distribution*: Dzh.-Kashgar, Mongolia. Described from Sarkhan River. Type in Leningrad.

31. *V. arenosa* (Serg.) Boriss. comb. nov.—*V. laeta* Kar. and Kir. var. *arenosa* Serg. Kryl. Fl. Zap. Sib. X (1939) 2446.

Perennial. Plant densely gray-tomentose due to short curved hairs, with woody roots. Stems numerous, woody below, 30–40 cm tall. Leaves alternate, often crowded, straight or curved, upper leaves linear, lanceolate,





lower opposite, oblong to lanceolate, broader in upper part, sparsely denticulate, often entire, subacute, gradually narrowed toward base, pubescent on both surfaces, somewhat thick. Raceme 3–8 cm long, narrow. Pedicels erect, about 1–1.5 cm long. Bracts filiform, shorter than pedicels. Calyx 1–1.5 mm long, 1/2 to 2/3 divided into ovate and oblong-ovate, acute, densely pubescent lobes. Corolla blue or sky-blue nearly 1/2 its length united into tube; limb hairy inside, with 4 oblong dissimilar lobes. Stamens exserted, anthers orbicular. Capsule up to 3 mm long, orbicular-cordate, slightly compressed, 2 times as long as calyx, glabrous, with narrow sinus; style 2–3 times as long as capsule. Seeds oblong, slightly concave on one side, smooth, about 1.5 mm long and 1 mm broad. July.

In sandy places. *Western Siberia*: Altai (southern part); *Soviet Central Asia*: Balkhash Region (Zaisan District). Endemic. Possibly grows in adjoining Sinkiang. Described from sands of Akkum in Zaisan Depression. Type in Leningrad.

- 391 32. *V. sessiliflora* Bge. ex Ldb. Fl. alt. I (1829) 32; C. Koch, Monogr. Veron. 34; Benth. in DC. Prodr. X, 464; Ldb. Fl. Ross. III, 230; Kryl. Fl. Zap. Sib. X, 2447.—*V. pinnata* var. *sessiliflora* (Bge.) Härle in Bibl. Bot. 104 (1932) 30; Stroh in Beih. Bot. Centralbl. LXI, 393.—*lc.*: Ldb. Ic. pl. fl. Ross. II, tab. 126.

Perennial. Roots fibrous, short. Plant glandular-pubescent. Stems erect or partially ascending, simple, 10–30 cm tall, few. Leaves alternate, lower leaves connivent in pairs, opposite, linear-lanceolate or oblong, 10–20 mm long, 3–7 mm broad, deeply pinnatipartite, but not reaching midrib, into oblong or lanceolate, subobtuse segments; upper leaves linear, almost entire; lower leaves petiolate. Inflorescence single terminal raceme, very dense and compact. Bracts linear, acute, exceeding calyx. Flowers subsessile or pedicels 1/3–1/2 as long as calyx. Calyx about 2 mm long, divided up to 2/3 or almost to base, densely glandular-pubescent with lanceolate lobes. Corolla light blue, about 4.5 mm long, up to 1/2 united into tube, with oblong-lanceolate lobes. Stamens exserted; anthers orbicular. Capsule (immature) oblong-ovate, cordate, with small sinus, glandular-hairy; style filiform, 3–4 times as long as calyx, persistent in fruit. July.

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Plate XVI.

*Veronica tenuissima* Boriss. general appearance of plant, capsule, seed.—2. *V. cardiocarpa* (Kar. and Kir.) Walpers, general appearance of plant, capsule, seed.—3. *V. karatavica* Pavl., general appearance of plant, seed.—4. *V. bucharica* B. Fedtsch., general appearance of plant, capsule, seed.—5. *V. biloba* L., general appearance of plant, capsule, seed.—6. *V. stylophora* M. Pop., general appearance of plant, seed.

Desert-steppe valleys and slopes. *Western Siberia*: Altai Region (Kurai and Chuya rivers, in vicinity of Lower Uimon). Endemic. Described from Kurai and Chuya rivers. Type in Leningrad.

33. *V. pinnata* L. Mant. I (1767) 24; Koch, Monogr. Veron. 34; Benth. in DC Prodr. X, 464; Ldb. Fl. Ross. III, 230; Römpp in Fedde Repert. Beih. L. 49, p.p.; Härle in Bibl. Bot. 104, 29; Kryl. Fl. Zap. Sib. X, 2446; Stroh in Beih. Bot. Centralbl. LXI, 393. *V. pinnatifida* Salisb. Prodr. (1796) 90.—*V. incisa* Soland in Ait. Hort. Kew. ed. 1 (1789) 19, non Schrad.—*Veronicastrum incisum* Moench, Meth. pl. Suppl. (1802) 158 p.p.— *Ic.*: Härle, l.c. tab. C. Abb. 15; Juel in Acta Horti Berg. 1 No. 5, tab. II, f. 23.

Perennial. Roots woody. Stems erect or partially ascending, numerous, woody near base. Plant pubescent throughout with short, appressed, upcurved hairs. Leaves 1–3 cm long, 0.5–2 mm broad, all, or almost all pinnately parted into linear or filiform, sometimes separate lanceolate lobes, often pubescent with short, curved and appressed hairs, rarely subglabrous; leaf axils with reduced shoots with smaller entire leaves, often linear or filiform. Raceme terminal, dense, 10–30 cm long. Pedicels almost equaling calyx or longer. Bracts linear, exceeding pedicels. Calyx 2–2.5 mm long, up to 2/3 incised into 4 lanceolate or ovate, acute lobes. 392 Corolla sky-blue, sometimes white or pinkish, 5–7 mm long, up to 1/2 united into tube, hairy inside; limb irregular, with subobtusely, ovate lobes of different width. Stamens with erect filaments, scarcely exerted. Capsule 3–5 mm long, 3–4 mm broad, obovate, slightly cuneate at base, slightly longer than calyx, smooth, glabrous, slightly compressed on sides, with acute sinus at tip; style 2–3 times as long as capsule, persistent in fruit, filiform and curved. Seeds about 1 mm long, 0.5 mm broad, ovate, slightly narrowed toward one side, with obtuse tip. June to July.

Stony and rubbly slopes, steppe regions.—*Western Siberia*: Altai Region, Irtysh. *Soviet Central Asia*: Balkhash Region, Dzh.-Tarbagatai; *Eastern Siberia*: Angara-Sayan. *General distribution*: Mongolia. Described from 'Siberia'. Type in London.

*Section 3. Omphalospora* Bess. Enum. pl. Volh. (1821) 85, nomen, Benth. in DC. Prodr. X, 485, p.p. *Cochlidiospermum* Rchb. Fl. Germ. exsc. (1830–1832) 365.—*Diplophyllum* Lehm. in Ges. Nat. Fr. Berl. Mag. VIII (1814) 310 p.p.—Flowers solitary, in axils of floral leaves, distinctly pedicellate, pedicels often nodding in fruit, crowded in terminal spicate-paniculate inflorescence. Calyx 4-partite or 2-partite, with lobes united in pairs. Corolla with very short tube, rotate. Capsule strongly laterally compressed, with valves adnate with placental column or later 2-partite, free. Seeds generally numerous, scaphoid or patelloid, oblong or orbicular, smooth or rugose. Cauline leaves opposite, sometimes in single whorl;



floral leaves alternate, similar to cauline leaves or upper ones different. Annuals, with slender roots, often very delicate.

*Series 1. Bilobae* Lehm. Zeitschr. Bot. II (1910) 586, gruppe, p.p.—Floral leaves different or similar to cauline leaves. Raceme lax or inflorescence paniculate-racemose. Pedicels filiform, recurved in fruit. Calyx lobes short-connate in pairs, ovate or lanceolate to linear. Capsule with broad or narrow sinus, bilobed. Seeds smooth or rugose, keeled.

34. *V. biloba* L. Mant. II (1771) 172; M.B. Fl. taur.-cauc. III, 15; Koch, Monogr. Veron. 14; Benth. in DC. Prodr. X, 485; Ldb. Fl. Ross. III, 252, p.p.; Boiss. Fl. or. IV, 464; Pflanzenfam. IV, 3b, 85; Wulff in Tr. Tifl. bot. sada, XV, 137; Kryl. Fl. Zap. Sib. X, 2452; Grossh. Fl. Kavk. III, 390; Römpf in Fedde, Repert. Beih. L, 80; Stroh in Beih. Bot. Centralbl. LXI, 402.—*V. biloba* var. *platysepala* Trautv. in Bull. Soc. Nat. Mosc. 393 (1866) 440.—*V. elbursensis* Boiss. Diagn. pl. or. 1, 12 (1853) 46.— *Ic.*: Rchb. Ic. bot. Cent. VII, 645; Vestn. Tifl. bot. sada, 28, fig. 21.— *Exs.*: HFAM, No. 159.

Annual. Roots slender. Plant sparsely pubescent with rigid hairs, 5–20(30) cm tall. Stem simple or branched in lower part, erect. Leaves all opposite, entire, oblong to broadly lanceolate, 5–15(20) mm long, 2–5(10) mm broad, lower ones short-petiolate, upper sessile, acuminate, entire or with sparsely serrate-dentate margin, scattered hairy or glabrous, base cuneate, or rounded in upper leaves. Bracts lanceolate or oblong-lanceolate, subobtuse or acute, entire, slightly shorter than or equaling pedicels, narrowed toward base. Inflorescence elongated, lax; flowers in upper leaf axils on filiform, spreading pedicels, sometimes elongated in fruit. Calyx glandular-hairy, with 4 ovate or oblong-lanceolate, acute lobes, united at base in pairs, with 3 rather distinct veins. Corolla blue, sky-blue or white, 1.5–2 mm long, 1/2 as long as calyx. Stamens included. Capsule laterally compressed, slightly shorter than or 2/3 as long as calyx, 3–4 mm long, 4–5 mm broad, broadly obcordate, glandular-hairy, divided almost up to base into oblong lobes, rounded at tips, with deep sinus; style included, 0.4–0.9 mm broad. Seeds 1–4 in locule, ovate, with scaphoid sinus, generally obscurely transversely rugose, pale yellowish, 1.2–1.5 mm long. April to July (Plate XVI, fig. 5).

In desert-steppes, on rubbly mountain slopes, in rocky places, up to alpine zone, sometimes in wastelands. *Caucasus*: Dagestan, eastern and southern Transcaucasia; *Western Siberia*: Altai Region; *Soviet Central Asia*: Balkhash Region, Aral-Caspian Region, Dzh.-Tarbagatai, mountainous Turkmenia, Syr Darya, Pamiro-Alai, Tien Shan. *General distribution*: Balkan States-Asia Minor, Armenia-Kurdistan, Iran, India-Himalayas. Described from Asia Minor. Type in London.



35. *V. chantavica* Pavl. in Vestn. Akad. Nauk KazSSR 5 (1952) 92.—*Ic.*: Pavl. l.c. fig. 30.

Annual. Stem cylindrical, 5–10 cm tall, slender, often branched from base; branches flexuous, very slender, sparsely pubescent in lower part with soft crispate and glandular hairs; stem glabrous above and along branches. Leaves opposite, lanceolate, often in 3 pairs, lower leaves petiolate, others subsessile; lamina narrowed at base, obtuse, glabrous on both surfaces, entire or rarely remotely crenate. Inflorescence 4–7 cm long, 394 1–1.5 cm broad. Pedicels filiform, 5–6 mm long in fruit, erect. Bracts linear-lanceolate, slightly shorter than pedicels at fruiting stage. Calyx 4-partite almost to base, with lanceolate lobes, 3–4 mm long, acuminate, generally 3-nerved, glabrous, not ciliate. Corolla shorter than calyx, sky-blue. Capsule obovate-cordate, 2.5–3 mm long, notched almost 3/4, glabrous, not ciliate. Style 1/4–1/3 as long as sinus. Seeds scaphoid, 1–1.2 mm long, yellow, transversely rugose under magnifying lens. May to June.

On dry rubbly low-mountain areas. *Soviet Central Asia*: Tien Shan (Chu-Ili low-mountain region). Endemic. Described from Chu-Ili Mountains. Type in Alma-Ata. Isotype in Moscow.

*Note.* N.V. Pavlov has reported var. *hirtella* Pavl., distinguished by the presence of glandular hairs on the upper parts of the plant. This is a form transitional to the allied *V. argute-serrata* Rgl. and Schmalh.

36. *V. argute-serrata* Rgl. and Schmalh. in Tr. Peterb. bot. sada, V, 2 (1877) 626; Pavl. in Vestn. Akad. Nauk KazSSR, 6, 48.—*V. campylopoda* Römpf in Fedde, Repert. Beih. L (1928) 80, non Boiss.; Stroh in Beih. Bot. Centralbl. LXI, 402. p.p.—*Exs.*: HFAM, No. 157.

Annual. Plant 5–25 cm tall, with slender roots, covered with distant simple, long hairs, intermixed with glandular hairs in inflorescence. Stem erect. Leaves entire, short-petiolate; Lower leaves opposite, sometimes alternate, cuneate-lanceolate to ovate, 15–25(40) mm long, 8–12 mm broad, acute, sometimes sharply incised, serrate-denticulate; floral leaves sometimes similar to cauline leaves. Inflorescence lax, racemose; flowers axillary, on filiform pedicels, almost equaling or exceeding bracts, arcuate-upcurved after flowering. Calyx 4-partite almost to base, with broad elliptical or oblong-lanceolate lobes at flowering stage, (5)7–11 mm long, entire, mucronate, generally 3-nerved mainly glandular-hairy or subglabrous; calyx lobes spreading in fruit, exceeding capsule. Corolla 3–4 mm long, pale sky-blue. Capsule compressed, 2/3 divided into lobes, with acute deep sinus, densely hirsute; lobes ovate, erect, twice as long as style; capsule locules often with 3 seeds. Seeds ovate-oblong, scaphoid, almost smooth or obscurely pilulose. Flowering March to June.

In foothills and mountains, on steppe slopes up to upper forest edges, sometimes near snow patches, at altitude of 1500–3000 m. *Caucasus*:

Southern Transcaucasia; *Soviet Central Asia*: Dzh.-Tarbagatai, mountainous Turkmenia, Syr Darya, Pamiro-Alai, Tien Shan. *General distribution*: Armenia-Kurdistan, Dzh.-Kashgar (Kuldzha), India-Himalayas. Described from Karakol River Valley in Ala-Tau Mountains. Type in Leningrad.

- 395 37. *V. bornmülleri* Hausskn. in Mitth. Bot. Ver. Thüring. IX (1891) 20; Römpf in Fedde, Repert. Beih. L, 80; Grossh. Fl. Kavk. III, 390; Stroh in Beih. Bot. Centralbl. LXI, 403.—*V. bartsiaefolia* Boiss. Fl. or. IV (1879) 464.—*V. biloba* var. *glandulissima* Bornm. in Beih. Bot. Centralbl. XXII (1907) 112.—*V. biloba* ssp. *bornmülleri* (Hausskn.) Wulff in Tr. Tifl. bot. sada, XV (1915) 133.

Annual. Plant branched from base, 5–10 cm tall. Stem crispate-hairy. Leaves petiolate, opposite, ovate, 1.5–3 cm long, 0.7–2 cm broad, with short cuneate-rounded base, sparsely large-toothed, subglabrous, with scattered hairs mainly along margin. Pedicels somewhat reflexed, recurved, shorter than bracts. Bracts lanceolate, dentate. Calyx glandular, with scattered short hairs, broad ovate, lobes united almost to middle, distinctly 3-nerved, with short-ciliate remotely denticulate margin; calyx lobes sometimes entire. Capsule shorter than calyx, puberulent, with irregular ovate, obtuse lobes, connate almost near base. Seeds 3–4 in locule, oblong, about 1.5 mm long, 1 mm broad, narrowed at one end with recurved undulate margin, dorsally tuberculate-undulate. May to June.

In mountains up to alpine zone, at 1600–1700 m. *Caucasus*: Southern Transcaucasia. *General distribution*: Balkan States-Asia Minor, Iran, Armenia-Kurdistan. Described from Akdag. Isotype in Leningrad.

38. *V. karatavica* Pavl. ex Nevski in Tr. Bot. inst. Akad. Nauk SSSR, 4 (1937) 320; Pavl. in Vestn. Akad. Nauk KazSSR, 6, 48.—*V. karatavensis* Pavlov in Sov. bot. 1 (1934) 27, nomen.

Annual. Stem erect, slender, branched, generally terminating into many-flowered racemose inflorescence. Stem and leaves densely pubescent with, long, glandular hairs. Leaves generally in one pair, oblong, acuminate, 8–12 mm long, 3–4 mm broad, with crenate margin, opposite, sometimes alternate, entire. Raceme lax, terminal; floral leaves dissimilar from cauline, lanceolate, 1/2–2/3 as long as pedicels. pedicels in fruit erect-arcuate, exceeding bracts and calyces, slender. Calyx lobes at anthesis broadly elliptical or ovate-oblong, mucronate, generally with 3 distinct nerves. Corolla slightly exceeding calyx, 2.5–3.5 mm long, sky-blue. Capsule less than 2/3 divided, with deep sinus, densely pubescent, with oblong-oval lobes, diverging at acute angle; style filiform, equaling sinus. Flowering April to July (Plate XVI, fig. 3).

Along upper edges of juniper forest zone.—*Soviet Central Asia*: Tien Shan (Karatau Range), Pamiro-Alai (Kugitang Range). Endemic.

- 396 39. *V. nevski* Boriss. nom. nov.—*V. perpusilla nevski* in Tr. Bot. inst. Akad. Nauk SSSR, 1, 4 (1937) 320, non Boiss.; B. Fedtsch. in Fl. Turkm. VI, 276.

Biennial. Plant 1–1.5 cm tall, glandular-pubescent throughout. Stem simple, slender. Leaves petiolate, ovate, oblong-lanceolate or lanceolate, 1.5–5 mm long, 1–2.5 mm broad, subobtusely entire. Flowers 1–4 in lax racemes, pedicels divergent, up to 3.5 mm long in fruit. Calyx lobes lanceolate, long tapering, 3 mm long, 1 mm broad, connate in pairs at base. Corolla camellia-blue. Capsule reniform, 2.75 mm broad, about 2 mm long, glandular-pubescent, with orbicular-ovate lobes, connate up to 1/2 its length. Style 1/2 as long as sinus. Seeds not known. Flowering, fruiting June.

In damp high-mountain meadows near snowbanks.—*Soviet Central Asia*: Pamiro-Alai (Kugitang Range), Endemic. Described from Kugitang Range. Type in Leningrad.

Series 2. *Rubrifoliae* Boriss.—Floral leaves dissimilar from cauline. Inflorescence lax, paniculate. Pedicels long, reflexed, pointing upward. Calyx lobes united in pairs at base or almost to middle, ovate or oblong.—Capsule lobes connate nearly up to apex. Seeds deeply cyathiform, smooth.

40. *V. rubrifolia* Boiss. Diagn. pl. or. I, 12 (1853) 46; Fl. or. IV, 465; Römpf in Fedde, Repert. Beih. L, 66; Stroh in Beih. Bot. Centralbl. LXI, 399.—*V. ferganica* M. Pop. in Tr. Turkest. Gos. univ. 4 (1922) 64; Stroh, l.c. 403; Pavl. in Vestn. Akad. Nauk KazSSR, 6, 49.—*l.c.*: M. Pop. l.c. fig. 4.—*Exs.*: HFAM, No. 163.

- Annual. Roots slender, poorly developed. Plant 1–7 cm tall, often reddish, pilose, glandular-hairy in upper part. Stem generally erect, often branched from base or middle, with spreading patent branches. Cauline leaves alternate, opposite only under inflorescence and near base, 3–7(10) mm long, entire, sometimes lower leaves sparsely crenate, dissimilar from bracts; petiole almost as long as lamina, often turning red. Flowers in many-flowered, lax, candelabrimiformis paniculate inflorescence. Pedicels exceeding linear, entire bracts and calyx, 4–6 mm long, curved upward at right angle. Calyx lobes 4 mm long in fruit, oblong or ovate, subobtusely, with 1–3 obscure nerves, glandular, united in pairs at base or almost to middle, equaling or slightly exceeding capsule. Corolla whitish or pale sky-blue, shorter than calyx, with ovate lobes. Stamens 4–4.5 mm broad. Capsule obovate, sharp notched, flat, with ovate lobes, sparsely glandular-hairy along margin, 1/2–2/3 connate, with rounded tips; style about 0.5 mm long. Seeds 3 in locule, curved, semipyriform, lemon-yellow at first, darkening later, glabrous, smooth, 1–1.5 mm long. 0.5–1.5 mm broad. Flowering and fruiting April (Plate XVIII, fig. 2).
- 397



On dry rubbly slopes, in sandy places, in mountains up to 3850 m.—*Western Siberia*: Upper Tobol (Mugojary), Irtysh, Altai; *Soviet Central Asia*: Aral-Caspian Region (Ust-Urt), Balkhash Region, Syr Darya, Pamiro-Alai, Tien Shan. *General distribution*: Iran, Dzh.-Kashgar (Kuldzha). Described from Mt. Elburz. Type in Geneva.

41. *V. albanica* C. Koch, in Linnaea, XXII (1849) 701; Römpp in Fedde, Repert. Beih. L, 71; Grossh. Fl. Kavk. III, 390; Stroh in Beih. Bot. Centralbl. LXI, 400; Wulff in Tr. Tifl. bot. sada, XV, 139.—*V. amoena* Boiss. Fl. or. IV (1879) 462, non Stev.

Annual. Stem erect, 5–8 cm tall, branched in upper part, rarely simple, pubescent. Lower leaves ovate, upper oblong, all serrate, short-petiolate, puberulent or glabrous. Bracts oblong, lower ones shorter than pedicels, upper nearly twice as long as pedicels. Flowers generally in few-flowered racemes. Pedicels in fruit erect, densely puberulent, glandular, slightly exceeding calyx and bracts. Calyx 7–8 mm long, with oblong-lanceolate, 1.5–2 mm broad, subacute, hirsute, often glandular lobes, united in pairs at base, 1.5–2 times as long as capsule,  $1\frac{1}{3}$  as long as corolla. Capsule bilobed, pilose, often densely glandular, orbicular, about 5 mm long and broad, with erect lobes, distinct veins, with narrow, acute-angled often indistinct sinus. Style 3–5 mm long, exserted from sinus. Seeds about 1.5 mm long, oval, concave, subglabrous, smooth. April to May.

On marly hills, dry slopes at 140–300 m. *Caucasus*: Eastern Transcaucasia (Apsheron Peninsula). Endemic. Described from hills near Caspian Sea. Type in Berlin.

Series 3. *Campylopodae* Boriss.—Floral leaves dissimilar from cauline. Raceme lax, many-flowered, elongated. Pedicels equaling calyx or longer. Calyx lobes short-united in pairs, narrowly lanceolate or linear, long tapering. Capsule divided almost up to base into ovate or oblong, spreading lobes. Seeds distinctly transversely rugose.

42. *V. campylopoda* Boiss. Diagn. pl. or. I, 4 (1844) 80; Benth. in DC. Prodr. X, 486; Boiss. Fl. or. IV, 464; pflanzenfam. IV, 3b, 85; Römpp in Fedde, Repert, Beih. L, 80, p.p.; Kryl. Fl. Zap. Sib. X, 2452; Grossh. Fl. Kavk. III, 390; Stroh in Beih. Bot. Centralbl. LXI, 402, p.p.—*V. biloba* auct. non L.; Ldb. Fl. Ross. III, 252; Hook, f. Fl. Brit. Ind. 4, 295.—*V. biloba* var. *dasycarpa* Trautv. in Bull. Soc. Nat. 398 Mosc. XXXIX, 4 (1866) 440; Wulff in Tr. Tifl. bot. sada, XV, 138.—*V. microtheca* Boiss. and Bal. in Boiss. Diagn. pl. or. II, 6, 131.—Bouloumoy, Fl. Liban and Syrie, tab. 315.—*Exs.*: HFAM, No. 161; Pl. exs. No. 92.

Annual. Plant with slender roots, mainly glandular-puberulent, 5–15 cm tall. Stem erect, terminating into simple or branched racemose inflorescence. Cauline leaves opposite, sometimes alternate,



oblong-lanceolate, 5–12 mm long, 2–5 mm broad; lower leaves short-petiolate, obscurely serrate or sparsely serrulate; other leaves entire, somewhat pubescent; floral leaves narrowly-linear, acute, entire or obscurely dentate, much dissimilar from cauline leaves. Raceme lax, 8–12-flowered, later elongated. Pedicels filiform, equaling or slightly exceeding calyx and bracts, arcuate and reflexed in fruit. Calyx lobes very short-united in pairs at base, narrowly lanceolate or linear, long and slender tapering, glabrous or sparsely glandular hairy, with 1 distinct vein and 2 obscure lateral ones. Corolla 2–3 mm long, almost 1/2 as long as calyx, blue or sky-blue. Capsule compressed, slightly shorter than or equaling calyx, about 3 mm long, 4 mm broad, divided almost to base into 2 obovate lobes diverging at 45° or more, glandular-hairy. Style 1/2 as long as sinus, 0.9–1.6 mm long. Seeds oblong-ovate, up to 1 mm long, scaphoid, concave, sharply transverse rugose above, narrowed at one end, March to May.

On dry slopes and loess hills, desert plains, in mountains from foothills and low-altitude regions to alpine zone. Sometimes as weed in kitchen gardens, plowed fields and vineyards. *Caucasus*: Eastern and southern Transcaucasia: *Western Siberia*: Altai Region; *Soviet Central Asia*: Aral-Caspian Region, Balkhash Region, Dzh.-Tarbagatai, Kyzyl-Kum, KaraKum, mountainous Turkmenia, Syr Darya, Tien Shan, Pamiro-Alai. *General distribution*: Mediterranean Region, Balkan-states-Asia Minor, Iran, India-Himalayas. Described from Arabia and environs of Aleppo. Type in Berlin.

43. *V. ramosissima* Boriss. Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XVII (1955).—*V. capillipes* Grig. Oprod. rast. okr. Stalinabada (1953) 244, non Nevski.

Annual. Roots slender, short. Stems 5–22 cm tall, erect, profusely branched from base; branches arcuate, scutate, many-flowered. Leaves oblong-lanceolate to lanceolate, subglabrous, serrate-dentate, pinnatipartite in lower part, sometimes along entire margin. Bracts linear, pointed, 2/5 as long as pedicels, glabrous, sparsely hairy along margin, entire, sometimes with 1–2 teeth. Flowers in long racemes, on long, filiform, slender, almost horizontally diverging pedicels, 4–5 times as long as calyx. Calyx about 3 mm long, with linear, slender lobes united at base in pairs, glabrous. Corolla sky-blue, about 9 mm across, with 3 orbicular and 1 oblong lobes with short hairs at base and along margins. Anthers with arcuate filaments, included. Style slightly exceeding calyx, filiform. Capsule equaling calyx, consisting of 2 elongated, oblong, glabrous lobes, sparsely hairy along margin; lobes connate at base at acute angle and bent like horse-shoe. Seeds 1 mm long, 0.5 mm broad, ovate, narrowed toward base, planoconcave, transversely rugose outside. May to June.

On slopes of loess hills, along roads, on sandy-pebbly terraces.— *Soviet Central Asia*: Pamiro-Alai (southern slopes of Hissar Range). Endemic. Described from vicinity of Stalinabad. Type in Leningrad.

*Note.* It is distinguished from *V. capillipes* Nevski by the longer and denser racemes, horizontally extended pedicels, calyx with linear lobes equaling the capsule, corolla about 9 mm across (and not 3.5–4 mm), and the oblong lobes of the capsule diverging at an acute angle and converging at the tips. It is distinguished from *V. bucharica* B. Fedtsch. by the horseshoe-shape of capsule and the position of its lobes; from *V. campylopodae* Boiss. by the capsule shape, seeds and profuse branching.

44. *V. bucharica* B. Fedtsch. in O. and B. Fedtsch. Perech. rast. Turkest. 5 (1913) 93; Stroh in Beih. Bot. Centralbl. LXI, 403; Pavl. in Vestn. Akad. Nauk KazSSR, 5, 92.

Annual. Roots slender. Plant puberulent, 3–15(20) cm tall. Stem erect, branched mainly in upper part. Leaves oblong-lanceolate, entire, petiolate; upper leaves sessile, with incise-serrate margin, opposite, sometimes alternate; floral leaves linear-lanceolate, shorter than pedicels. Flowers in lax racemes, on filiform, almost nodding pedicels, reflexed in fruit, exceeding calyx and bracts. Calyx lobes linear-lanceolate or sublinear, long and slender acuminate, spreading, 3-veined, with sparse and short bristly hairs. Corolla exceeding calyx, 8–10 mm long. Capsule glandular, compressed, shorter than calyx, divided almost up to base into elongated, almost horizontally diverging lobes; style filiform, exceeding capsule lobes. Seeds generally shallowly rugose, planoconcave, about 1.5 mm long, 1 mm broad, pyriform. April to May (Plate XVI, fig. 4).

On mountain slopes and in passes, on dry pebbly river beds at altitude of 1000–2500 m.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described 'from Bukhara' (Regel 7/V 1883). Type in Leningrad.

400 45. *V. capillipes* Nevski in Tr. Bot. inst. Akad. Nauk SSSR, 1, 4 (1937) 319.

Annual. Plant sparsely glandular-pubescent. Stem erect, slender, branched from middle, 9–18 cm tall, 0.5–1.25 cm thick, leafy. Leaves rather thick, 5–18 mm long, 2.5–6 mm broad, short-petiolate; lower leaves ovate or oblong-ovate, obscurely crenate-dentate, or almost entire; upper leaves oblong-lanceolate, serrate-dentate. Racemes lax, elongated, generally 15–25-flowered. Floral leaves 3–5.5 mm long, 1–2 mm broad, lanceolate, acute, entire, 1/3 as long as pilose petioles. Pedicels slender, glabrous, 1–1.2 cm long in fruit, erect, spreading, later almost falcate. Calyx lobes oblong-lanceolate, acute, 2–3 mm long, 0.6 mm broad, up to 4 mm long and 1–1.25 mm broad after flowering, glabrous, 1-veined. Corolla blue or sky-blue, small, 3.5–4 mm across. Capsule exceeding

calyx, 4 mm broad, brown, with long hairs, broad sinus at tip, oblong-obovate, with ovate, 2.75 mm long and 1.25 mm broad lobes, diverging almost at right angle; style persistent, up to 2 mm long. April to June.

In woody scrub zone, in stony places. *Soviet Central Asia*: Pamiro-Alai (Kugitang Range). Endemic. Described from Kugitang Range. Type in Leningrad.

46. *V. stylophora* M. Pop. in Sched. ad Herb. Fl. As. Med. VI-VII (1925) 21; Stroh in Beih. Bot. Centralbl. LXI, 403.—*Exs.*: HFAM, No. 167.

Annual. Plant profusely branched from base, densely puberulent, 5–10(15) cm tall, profusely flowering and fruiting. Cauline leaves few, lanceolate or oblong, with spaced dentate margin, short-petiolate, subsessile or sessile, subglabrous; floral leaves linear, equaling or shorter than pedicels. Pedicels slightly exceeding calyx, elongated in fruit, spreading or arcuate-reflexed. Calyx lobes 4, united at base, oblong-lanceolate or linear-lanceolate, 3–4 mm long, acuminate, diffusely hispidulous, with 1 obscure vein, rarely with 3 veins. Corolla pale sky-blue or whitish, 6–7(10) mm  
403 across. Capsule 3–4 mm long and broad, densely pilose, often glandular, with broad sinus and oblong-ovate lobes diverging at right angle; style exserted, slender, filiform, curved. Seeds about 1.5 mm long, 0.5 mm broad, oblong, scaphoid, dorsally transversely rugose. Flowering April to May. Fruiting May (Plate XVI, fig. 6).

On clayey slopes.—*Soviet Central Asia*: Pamiro-Alai (Kitab, vicinity of Dignau, Takhta-Karacha Pass). Endemic. Described from vicinity of the village of Mussakak. Type in Tashkent. Isotype in Leningrad.

Series 4. *Tetraphyllae* Boriss.—Cauline leaves 4 in whorl at base of branching stem. Bracts markedly dissimilar from cauline leaves. Pedicels long, generally recurved. Calyx lobes lanceolate, united at base in pairs. Capsule with ovate or orbicular lobes, connate up to 2/3.

47. *V. tenuissima* Boriss. nom. nov.—*V. tetraphylla* Pop. in Tr. Turk-est. Gos. univ. 4 (1922) 65, non *V. tetraphyllos* Boeber ex Georgi, Besch. Russ. Reich. I–IV, 3 (1800) 653 and app.; Schmalh. Fl. II, 279; Stroh in Beih. Bot. Centralbl.—LXI, 407.

Annual. Roots slender. Stem 5–7 cm tall, erect; slender, sparsely pubescent or glabrous, terminating into racemose, generally many-flowered inflorescence. Cauline leaves 4 in whorl near base of slender-branched inflorescence, 3–10 mm long, oblong or oblong-lanceolate, entire, glabrous or subglabrous, sometimes violet underneath. Bracts markedly dissimilar from cauline leaves, sublinear, 1/6–1/2 as long as pedicels, glabrous. Flowers on very slender pedicels, generally recurved at right angle, 3.5–12 mm long, erect or arcuate in fruit, horizontally



diverging, 2–3(5) times as long as calyx. Calyx lobes lanceolate, acute, with obscure vein, slightly exceeding capsule, about 2 mm long, united at base in pairs. Corolla sky-blue, 1–1.5 mm across, shorter than calyx. Capsule 2.5 mm broad, obcordate, divided almost  $\frac{2}{3}$  into 2 lobes, with ovate or rounded, obtuse lobes, with narrow or broad, deep sinus; style 0.5–0.75 mm long, included. Seeds 0.5–0.75 mm long, oblong, shallowly concave on one side, dorsally sparsely crispate-tuberculate. Flowering April to May (Plate XVI, fig. 1).

On loamy plains, in foothills and low mountains.—*Soviet Central Asia*: Aral-Caspian Region (Ust-Urt), Balkhash Region (Betpakdala), Tien Shan (Sarytau and Karatau mountains), Pamiro-Alai (western Pamir). *General distribution*: Iran, Dzh.-Kashgar (Kudzh). Described from Sarytau mountains. Type in Tashkent. Isotype in Leningrad.

Series 5. *Cardiocarpae* Boriss.—Cauline leaves connivent in whorl at base of forks or slightly apart. Bracts dissimilar from cauline leaves. Pedicels equaling or slightly exceeding calyx. Calyx lobes united up to  $\frac{1}{2}$  in pairs. Capsule lobes connate up to  $\frac{2}{3}$ .

48. *V. intercedens* Bornm. in Beih. Bot. Centralbl. 22 (1907) 112; Römpf in Fedde, Repert. Beih. L, 81; Stroh in Beih. Bot. Centralbl. LXI, 403.—*V. cardiocarpa* Wulf in Tr. Tifl. bot. sada, XV (1915) 23, non Walp.—*V. mogoltavica* M. Pop. ex Vved. in Bull. Univ. As. Cent. XI, Suppl. (1925) 19; Stroh, l.c.—*V. gaudanesis* B. Fedtsch. in Fl. Turkm. VI (1954) 274.—*Exs.*: HFAM, No. 162.

Annual. Roots slender. Stem erect, terminating generally into many-flowered inflorescence; base of inflorescence branches with 4 linear or linear-lanceolate leaves, crowded in whorl or slightly apart in pairs. Sometimes cauline leaves only opposite, apparently partly shedding; these leaves markedly dissimilar from bracts, narrowed at base, broadest in upper part, entire or obscurely, sparsely dentate, short-petiolate. Bracts lanceolate, entire. Pedicels equaling or slightly exceeding calyx, arcuate-recurved. Calyx lobes united up to  $\frac{1}{2}$  in pairs, diverging, broadly-ovate, acuminate, entire or short-ciliate with 3–4 distinct veins along margin; calyx 6–7(10) mm broad in fruit. Capsule about 5 mm broad, 4 mm long, sparsely glandular, with deep sinus  $\frac{1}{3}$  the length of capsule, with obtuse ovate lobes, connate up to  $\frac{3}{4}$ ; style nearly equaling sinus or slightly exserted, about 1 mm long. Seeds orbicular or ovate, deeply concave, cyathiform, 1–2 mm long, 0.75–1.5 mm broad, very finely crispate on convex side, of lemon color. April to May.

Among bushy thickets in steppe, in tall-grass steppe, in juniper zone, on stony slopes and rocky places up to 1500–3300 m. *Caucasus*: Southern Transcaucasia. *Soviet Central Asia*: Dzh.-Tarbagatai, mountainous Turkmenia, Syr Darya, Pamiro-Alai, Tien Shan; *General distribution*: Iran





(Kerman Province), Armenia-Kurdistan. Described from Kurdistan. Type in Leningrad.

49. *V. cardiocarpa* (Kar. and Kir.) Walpers, Repert. III (1844–1845) 355; Benth. in DC. Prodr. X, 485; Ldb. Fl. Ross. III, 252; Römpp in Fedde, Repert. Beih. L, 81; Stroh in Beih. Bot. Centralbl. LXI, 403.—*V. griffithii* Benth. in DC. Prodr. X, 485 (p.p.)—*Diplophyllum cardiocarpum* Kar. and Kir. in Bull. Soc. Nat. Mosc. XV (1842) 417.—*Exs.*: HFAM, No. 162.

Annual. Roots slender. Stem erect, pubescent, generally terminating into many-flowered inflorescence. Cauline leaves whorled or nearly so, 4 together at inflorescence base, markedly different from bracts, oblong-ovate, with rounded base, broadest in middle or below, serrate-crenate; 405 lower leaves serrate, upper tridentate, uppermost entire; floral leaves reduced. Pedicels equaling or slightly longer than calyx, longer than bracts in fruit, erect or slightly curved. Calyx lobes 2 times as long as capsule, broad, rhombic-ovate, 2–3-veined, short-pointed, united in pairs almost upto middle, antrorse, sparsely ciliolate. Capsule obcordate, deeply emarginate, with sinus up to 1/3, rarely up to 1/2 deep, with obtuse, orbicular-ovate lobes. Seeds about 1.25 mm long, about 1 mm broad, ovate, deeply cyathiform, smooth or almost so, lemon-yellow. Flowering from March to April (Plate XVI, fig. 2).

Foothills and mountains. On rubbly slopes, in mountain forests, among shrubby undergrowth, in glades near snowbanks.—*Soviet Central Asia*: Aral-Caspian Region, Balkhash Region, Dzh.-Tarbagatai, mountainous Turkmenia, Syr Darya, Pamiro-Alai, Tien Shan. *General distribution*: Iran, India-Himalayas, Dzh.-Kashgar. Described from Ala-Tau mountains. Type in Leningrad.

Series 6. *Pellidospermae* Lehm. in Zeitschr. Bot. II (1910) 599, gruppe, p.p.—Flowers in lax terminal and lateral racemes. Bracts similar to upper cauline leaves, 3-partite or entire. Pedicels slightly exceeding or equaling bracts. Calyx divided almost to base into obtuse or acute lobes. Capsule slightly inflated, orbicular-obcordate or orbicular-oblong, hard. Seeds 6–10 in locule, cyathiform or scaphoid-concave.

50. *V. triphyllos* L. Sp. pl. (1753) 14; M.B. Fl. taur.-cauc. I, 15; C. Koch, Monogr. Veron. 12; Benth. in DC. Prodr. X, 486; Boiss. Fl. or. IV, 463; Ldb. Fl. Ross. III, 252; Pflanzenfam. IV, 3b, 85; Schmalh. Fl. II,

#### Plate XVII.

*Veronica amoena* Stev., general appearance of plant, capsule.—2. *V. triphyllos* L., general appearance of plant, capsule, seed.—3. *V. ceratocarpa* C.A.M., general appearance of plant, capsule, seed.—4. *V. persica* Poir., general appearance of plant, capsule, seed.—5. *V. didyma* Ten., general appearance of plant, capsule.

281; Wulff in Tr. Tifl. bot. sada, XV, 151; Grossh. Fl. Kavk. III, 391; Römpf in Fedde, Repert. Beih. L, 70; Stroh in Beih. Bot. Centralbl. LXI, 400.—*V. quinquefolia* Gilib. Fl. lith. I (1781) 120.—*V. quinquefida* Gilib. l.c.—*V. collina* Opiz, Natur. 9 (1825) 108.—*Cochlidiospermum digitatum* Opiz, Seznam (1852) 31.—*l.c.*: Fedtsch. and Fler. Fl. Evrop. Ross. fig. 809; Syreistsch. III. fl. Mosk. gub. III, 135; Hegi, Illustr. Fl. Mittel-Eur. IV, I, tab. 239, f. 7; Vestn. Tifl. bot. sada, 28, fig. 22; Javorka è Csapody, Iconogr. fl. Hung. No. 3309.—Exs.: GRF, No. 1678; Fl. pol. exs. No. 373; Fl. exs. austro-hung. No. 2626; Fl. Ital. exs. No. 1122.

Annual or biennial. Plant dark green, patently pilose and glandular. Stem (5)8–15(20) cm tall, simple or branched, generally with a few lateral shoots at base, erect or procumbent. Lower leaves petiolate, ovate or orbicular-ovate, dentate or incise-crenate; middle leaves orbicular-ovate, sessile, 3–5(7)-palmately incised or divided into obtuse linear lobes almost up to base, middle lobe being larger; all leaves scattered glandular, 1 cm long; upper leaves sessile, 3-partite, gradually transforming into entire or 3-lobed bracts with obtuse, lanceolate to linear lobes. Pedicels generally exceeding calyx and bracts, often upcurved, diverging at acute angle in fruit, puberulent, with long glandular hairs. Flowers few in elongated terminal and lateral racemes. Calyx with obtuse, lanceolate to spatulate lobes 1/2 as long as pedicels, densely glandular. Corolla 6–9 mm across, deep blue, slightly shorter than calyx. Capsule somewhat inflated at base, slightly compressed above, orbicular-obcordate, about 7 mm long and broad, with deep broad sinus, lobes at acute or obtuse angle, glandular; style 1–2 mm long, slightly exserted from sinus. Seeds often 10 in locule, concave on one side, convex on the other, scaphoid, oval, 1–2 mm long, dark. March to April (Plate XVII, fig. 2).

In forest, forest-steppe and steppe zones, wastelands, fallow lands, in mountains up to 1500 m. *European USSR*: Baltic Region, Upper Volga, Upper Dnieper, Middle Dnieper, Volga-Don, Bessarabia, Black Sea Region, Crimea, Lower Don, Lower Volga; *Caucasus*: Ciscaucasia, Eastern Transcaucasia, Talysh; *Eastern Siberia*: Angara-Sayan (Krasnoyarsk, introduced); *Soviet Central Asia*: (?) Aral-Caspian Region. *General distribution*: Central Europe, Atlantic Europe, Mediterranean Region, Balkan States-Asia Minor, Armenia-Kurdistan. Described from Europe. Type in London.

51. *V. praecox* All. Fl. Pedem. (1789) 5, tab. 1, f. I; M.B. Fl. taur.-cauc. III, Suppl. 18; Benth. in DC. Prodr. X, 487; C. Koch, Monogr. Veron. 11; Ldb. Fl. Ross. III, 253; Boiss. Fl. or. IV, 463; Pflanzenfam. IV, 3b, 85; Schmalh. Fl. II, 281; Wulff in Tr. Tifl. bot. sada, XV, 152; Grossh. Fl. Kavk. III, 391; Römpf in Fedde, Repert. Beih. L, 69; Stroh in Beih. Bot. Centralbl. LXI, 399.—*V. viscida* Waldst. ex Roem.



and Schult Syst. veg. I (1817) 124.—*Cochlidiospermum praecox* Opiz, Seznam (1852) 31.— *Ic.*: Fedtsch. and Fler. Fl. Evrop. Ross. fig. 808; Hegi, Illustr. Fl. Mittel-Eur. IV, 1, f. 30; Javorka és Csapody, Iconogr. fl. Hung. f. 3315; Vestn. Tifl. bot. sada, 28, fig. 29.— *Exs.*: Fl. exs. Reipubl. Boh.-Slov. No. 468.

Annual or biennial. Plant patently puberulent. Stem (3)5–20(30) cm tall, without trailing vegetative shoots, erect, generally profusely branched in lower part. Leaves all entire, short-petiolate, upper leaves sessile, ovate, cordate or rounded at base, uppermost leaves obtuse, crenate or crenate-dentate to sinuate, scattered hairy upper leaves gradually transforming into bracts; lower leaves broadly ovate to ovate-deltoid, up to 1.5 cm long, 1 cm broad. Racemes terminal, lax, sometimes axillary, lateral. Lower bracts 407 similar to leaves, upper smaller, lanceolate, denticulate or entire, slightly exceeding pedicels. Pedicels equaling or exceeding calyx, erect or curved, appressed to inflorescence axis, scattered glandular. Calyx shorter than corolla, with obtuse lobes, scattered glandular-hairy or glabrous. Corolla dark blue, 5–7 mm across, 3 corolla lobes orbicular, 1 lobe ovate, all obtuse. Anthers included. Capsule orbicular-ovate, 3–5 mm long, 4–5 mm broad, equaling or slightly exceeding calyx, glandular-hairy, obscurely emarginate almost at right angle. Style exerted, 1–2 mm long. Capsule locule with 6–9 seeds. Seeds about 1 mm long, cyathiform, oval, weakly rugose, yellowish brown. March to May.

On stony slopes of foothills, in steppe and old fields in forest-steppe zone; in long-fallow lands, up to 500 m. *European USSR*: Upper Dniester, Bessarabia, Black Sea Region, Lower Don, Crimea; *Caucasus*: Ciscaucasia, Dagestan, eastern Transcaucasia, Talysh. *General distribution*: Central Europe, Atlantic Europe, Mediterranean Region, Balkan States-Asia Minor. Described from Europe. Type in Florence?

52. *V. amoena* Stev. in M.B. Fl. taur.-cauc. I (1808) 14; III (1819) 15; Koch, Monogr. Veron. 13; Benth. in DC. Prodr. X, 484; Ldb. Fl. Ross. III, 251; Boiss. Fl. or. IV, 462; Wulff in Tr. Tifl. bot. sada, XV, 150; Grossh. Fl. Kavk. III, 390; Stroh in Beih. Bot. Centralbl. LXI, 400.—*V. albanica* Boiss. Fl. or. (1879) 462, non C. Koch.— *Ic.*: M.B. Cent. pl. rar. ross. I, tab. 18; Karjagin, Fl. Apsherona, plate XVIII, 3.— *Exs.*: Herb. Fl. Cauc. No. 489.

Annual. Plant densely puberulent with simple and glandular hairs. Stem simple or branched in lower part, 5–8(15) cm tall. Leaves small, short-petiolate, ovate or oblong-ovate, dentate-crenate or serrate-dentate; lower leaves more deeply dentate, subcordate or subcuneate at base; floral leaves oblong-lanceolate or lanceolate, entire, lower leaves shorter, almost 2 times as long as pedicels. Flowers in lax terminal racemes. Pedicels 7–11 mm long, equaling calyx, shorter or slightly longer, erect



in fruit. Calyx lobes lanceolate or oblong-lanceolate, acute, free almost up to base, 6–10 mm long; upper 2 lobes sometimes slightly longer than lower, all villous and glandular. Corolla bright blue, white at base, 12–16(18) mm across, exceeding calyx, with 3 orbicular-ovate, angular lobes and 1 ovate lobe; corolla tube short, with 4 veins. Capsule, pedicels and calyx pubescent with simple and glandular hairs. Capsule somewhat inflated, orbicular-obcordate, about 4 mm long, hard, almost equaling or  
 408 1/2–2/3 as long as fruit stalk, shorter than calyx, with deep narrow sinus between broad erect lobes; style 3–5 mm long. Seeds 1–1.5 mm long, about 1 mm broad, oblong, cyathiform or scaphoid, concave, smooth. April to May (Plate XVII, fig. 1).

On dry clayey, sandy slopes and plains, on pebble-beds. *Caucasus*: Eastern Transcaucasia; *Soviet Central Asia*: Aral-Caspian Region (Mangyshlak). Endemic. Described from Georgia. Type in Berlin.

Series 7. *Agrestes* Lehm. in Bull. l'Herb. Boiss. 2 sér (1908) 8; Zeitschr. Bot. II, 597, gruppe, p.p.—Leaves oval, short-petiolate, dentate or serrate; floral leaves similar to cauline leaves. Pedicels curved, nodding in fruit. Calyx lobes entire, free at base. Capsule lobes diverging at acute, right or obtuse angle, smooth or distinctly veined. Seeds 4–12 in locule, minute, smooth, cyathiform.

53. *V. agrestis* L. Sp. pl. (1753) 13; C. Koch, Monogr. Veron. 14; Benth. in DC. Prodr. X, 487; Ldb. Fl. Ross. III, 254, p.p.; Boiss. Fl. or. IV, 466; Pflanzenfam. IV, 3b, 85; Schmalh. Fl. II, 282; Römpf in Fedde. Repert. Beih. L, 85; Stroh in Beih. Bot. Centralbl. LXI, 404.—*V. didyma* Spreng. Syst. veg. (1825) 75, non Tenore.—*Cochlidiospermum agreste* Opiz, Seznam (1852) 31.— *Ic.*: Rchb. Ic. fl. germ. tab. 79, 1700, cf. II and III; Fedtsch. and Fler. Fl. Evrop. Ross. fig. 410; Syreistsch. Fl. Mosk. gub. III, 157; Hegi, Illustr. Fl. Mittel-Eur. IV, 1, f. 3 c–g; Javorka ès Csapody, Iconogr. fl. Hung. f. 3324.— *Exs.*: GRF, No. 631; Hayek, Fl. Stir. exs. No. 663.

Annual. Stem 5–30(40) cm tall, ascending, decumbent and rooting, slender, profusely branched from base, leafy. Plant sparsely lanate. Leaves opposite, ovate or orbicular-ovate, uppermost leaves oblong-ovate, 7–9 mm long, 6–8 mm broad, with crenate, serrate-dentate or coarsely dentate margin, light green; lower leaves cordate-ovate, rounded or truncate at base, short-petiolate, reducing upward; upper leaves oblong, all dentate, cuneate, somewhat fleshy, sparsely pilose. Flowers borne singly or few together in leaf axils, on long pedicels equaling flowers or slightly longer, reflexed in fruit. Calyx deeply 4-partite; calyx lobes ovate to oblong-lanceolate, with 3 distinct veins, obtuse, rounded or rounded-cuneate at base, not overlapping, sparsely hairy or subglabrous. Corolla light sky-blue with whitish lower lobe, whitish with blue veins, pale pink

or white, 6–8 mm across, not exceeding calyx. Stamens much shorter than corolla. Capsule slightly shorter than calyx, as long as broad or slightly broader than long, inflated, orbicular, short-obcordate, glandular-hairy, with narrow deep sinus, with rounded, obtuse, finely reticulate lobes, obscurely veined; capsule lobes diverging at acute to right angle, densely covered with short, simple, glandular hairs along margin; style included or scarcely exerted from sinus, about 1.5 mm long. Seeds 3–10 in locule, 1.75–2 mm long, 1.5–1.75 mm broad, orbicular or ovate-globose, finely rugose, concave, patelliform. February to October.

Weed in fields, gardens, kitchen gardens, in forest and forest-steppe zones, rarely in foothills and mountains up to 1800 m, in mixed-grass areas. *European USSR*: Baltic Region, Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnieper, Volga-Don, Lower Don. *General distribution*: Scandinavia, Central Europe, Atlantic Europe, Mediterranean Region, Balkan States-Asia Minor. Described from Europe. Type in London.

54. *V. didyma* Ten. Fl. Napol. Prodr. (1811) 6; C. Koch, Monogr. Veron, 13; Boiss. Fl. or. IV, 466; Stroh in Beih. Bot. Centralbl. LXI, 403.—*V. polita* Fries in Nov. Fl. Suec. IV (1819) 63; ed. II (1828) 1; C. Koch, l.c. 14; Pflanzenfam. IV, 3b, 85; Schmalh. Fl. II, 282; Wulff in Tr. Tifl. bot. sada, XV, 153; Römpf in Fedde, Repert. Beih. L, 84; Grossh. Fl. Kavk. III, 383.—*V. agrestis* auct. non L.; M.B. Fl. taur.-cauc. I (1808) 14, p.p.; III (1819) 16; Benth. in DC. Prodr. X, 488; Ldb. Fl. Ross. 254, p. p.—*V. agrestis*  $\beta$ . *polita* (Fries) Koch in Linnaea, 17 (1843) 288.—*V. hederifolia* Miq. ex Maxim. in Bull. Acad. Pétersb. 27 (1881) 510, non L.—*V. opaca* B. Fedtsch. in Fl. Turkm. VI (1954) 278, non Fries.—*V. longipedunculata* Gilib. Fl. Lith. I (1781) 118.—*IC.*: Fl. Dan. III, tab. 449; Rchb. Ic. Bot. III, tab. 246, f. 404, 405; Rchb. Ic. fl. germ. XX, tab. 77, 1698, I–II; Pflanzenfam. IV, 3b (1895) f. 38; Wulff in Vestn. Tifl. bot. sada, 28, fig. 13; Hegi, Illustr. Fl. Mittel-Eur. IV, 1, tab. 239, f. 9, ed. 26; Fl. Yugo-Vost. VI, 212; Javorka ès Csapody, Iconogr. fl. Hung. f. 3325.—*Exs.*: HFAM, No. 166; GRF, No. 830; Fl. Finl. exs. No. 919; Fl. exs. austro-hung. No. 2631 and 2629.

Annual or biennial. Roots slender, short. Plant crispate-pilose, (4)10–25 cm tall. Stem weak, slender, decumbent, ascending, with partially ascending or decumbent shoots at base, densely leafy. Leaves short-petiolate, orbicular-cordate to ovate, 7–9(10) mm long, 6–7 mm broad, subdeltoid, truncate, rounded or cordate at base, somewhat thick, often with deeply coarsely crenate margin, glabrous or diffusely pilose. Flowers borne singly on long pedicels, in axils of ordinary or slightly reduced leaves. Pedicels reflexed after flowering, almost equaling or slightly longer than leaves, diffusely pilose. Calyx deeply 4-partite, lobes broadly ovate, with distinct veins, margins slightly overlapping at base, acute, up to 5 mm

long in fruit, equaling or 1.5 times as long as capsule, hispid with scattered hairs. Corolla deep sky-blue or blue, with purple throat, (4)5–8 mm across, slightly longer than or equaling calyx; corolla tube very short, with 5 veins; limb with 3(4) orbicular-ovate and 1 ovate lobes. Stamens included, curved. Capsule slightly shorter than calyx, slightly inflated, suborbicular or reniform, broader than long, with 2 inflated lobes, generally with small narrow sinus; sinus broader if lobes diverging at right angles; lobes with rounded margin, without keel, obscurely veined, densely, patently pilose with simple hairs sparsely intermixed with glandular hairs or capsule glabrous; style exerted from sinus, short and erect. Seeds 6–12 in each locule, 1–1.5 mm long, oval, scaphoid-concave, rugose. March to October (Plate XVII, fig. 5).

In wastelands, pastures, shrubby undergrowth, in pebbly soil of foothills and plains, up to 500 m altitude. *European USSR*: Karelia-Lapland, Dvina-Pechora, Upper Dnieper, Bessarabia, Black Sea Region, Crimea, Volga-Don, Lower Don, Lower Volga; *Caucasus*: Ciscaucasia, Dagestan, western, eastern and southern Transcaucasia, Talysh; *Soviet Central Asia*: KaraKum, mountainous Turkmenia, Syr Darya, Pamiro-Alai, Tien Shan. *General distribution*: Scandinavia, Central Europe, Atlantic Europe, Mediterranean Region, Balkan States-Asia Minor, Armenia-Kurdistan, Iran, India-Himalayas, Mongolia, Japan, China, Tibet. Described from Italy. Type in Florence.

*Note.* *V. agrestis* var. *minima* O. Ktze. and *V. opaca* reported from Turkmenia, are also related to this species.

55. *V. opaca* Fries, Nov. Fl. Suec. 2 (1828) 3; C. Koch, Monogr. Veron. (1833) 14; Boiss. Fl. or. IV, 467; Pflanzenfam. IV, 3b, 85; Schmalh. Fl. II, 282; Stroh in Beih. Bot. Centralbl. LXI, 404.—*V. agrestis* Ldb. Fl. Ross. III (1847–1849), 254, p.p. non L.—*Cochlidiospermum friesianum* Opiz, Seznam (1852) 31.—*C. opacum* Opiz, l.c.—*l.c.*: Rchb. Ic. fl. Germ. tab. 79, 1700, f. 1; Syreistsch. Ill. fl. Mosk. gub. Ill, 157; Hegi, Illustr. Fl. Mittel-Eur., IV, I, fig. 31 a–b; Javorka ès Csapody, Iconogr. fl. Hung. f. 3326; *Exs.*: GRF, No. 780; Fl. pol. exs. No. 763 Fl. exs. austro-hung. No. 2629; Billot, Fl. Gall. and Germ. Exs. No. 3169.

Annual. Plant dark green, somewhat pubescent. Stem 5–30 cm tall, decumbent or partially ascending, slender, simple or branched. Leaves somewhat dull, faded green, suborbicular-ovate, subcordate at base, short-petiolate, crenate or coarsely serrate-dentate, pubescent on both surfaces. Flowers borne singly in leaf axils, on long pedicels, slightly exceeding  
 411 or equaling leaves, arcuate-reflexed in fruit. Calyx deeply 4-partite; calyx lobes densely pubescent, diverging in fruit, not overlapping, ovate or oblong-ovate, almost spatulate, obtuse, exceeding capsule, densely gray-pilose. Corolla sky-blue or blue, 3–4 mm across, equaling or



exceeding calyx. Stamens inserted in corolla throat. Capsule broader than long, about 6 mm broad, 3–4 mm long, orbicular-obcordate or reniform, inflated and slightly compressed on sides, bilobed; sinus obtuse, broad, shallow, acute- or obtuse-angled; lobes rounded, firm with keeled margin and distinct veins, densely pubescent; style short, slightly exerted from sinus or included. Seeds 6–7 in locule (often 4–5), ovate, 1–1.8 mm long, patelloid-concave, rugose, ribbed. March to October.

In kitchen gardens, gardens, plowed fields, near roads.—*European USSR*: Baltic Region, Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don. *General distribution*: Scandinavia, Central and Atlantic Europe. Described from Sweden. Type in Stockholm.

56. *V. persica* Poir. Dict. Encycl. Méth. VIII (1808) 542; Steven in Mém. Soc. Nat. Mosc. V, 341; Kryl. Fl. Zap. Sib. X, 2453; Sugawara, Illustr. Fl. Saghal. IV, 1649; Stroh in Beih. Bot. Centralbl. LXI, 404.—*V. tournefortii* C.C. Gmel. Fl. Bad. I (1805) 39, p.p. non Villars. (1779 and 1786) nec F. W. Schmidt (1791); Pflanzenfam. IV, 3b, 85; Schmalh. Fl. II, 281; Wulff in Tr. Tifl. bot. sada, XV, 158; Grossh. Fl. Kavk. III, 383; Römpp in Fedde, Repert. Beih. L, 85.—*V. filiformis* auct. non Smith; DC. Fl. Fr. V, Suppl. (1815) 388; M.B. Fl. taur.-cauc. I, 15, p.p.—*V. buxbaumii* Ten. Fl. Napol. I (1811) 7, tab. I; M.B. Fl. taur.-cauc. III, Suppl. 16; C. Koch, Monogr. Veron. 13; Benth. in DC. Prodr. X, 487; Ldb. Fl. Ross. III, 253; Boiss. Fl. or. IV, 465.—*V. meskhetica* Kem.-Nath. Fl. Gruz. VII (1952) 580; Zam. po sist. i geogr. rast. Bot. inst. Akad. Nauk GruzSSR, 18.—*Cochlidiospermum buxbaumii* Opiz, Seznam (1852) 31.—*Inc.*: Rchb. Ic. fl. Germ. XX, vol. 78, (1699); Fedtsch. and Fler. Fl. Evrop. Ross. fig. 812; Vestn. Tifl. bot. sada, 28, fig. 27; Karyagin, Fl. Apsheron, Plate XVIII, fig. 4; Hegi, Illustr. Fl. Mittel-Eur. IV, 1, tab. 239, f. 8; Fl. Gruz. VII, fig. 350. Javorka ès Csapody, Iconogr. fl. Hung. f. 3323.—*Exs.*: HFAM, No. 168; GRF, No. 475; Fl. exs. austro-hung. No. 2627; Hayek, Fl. Stir. exs. No. 1248.

Annual or biennial. Stems solitary or few together, 10–70 cm tall, weak, procumbent or partially ascending, rooting, simple or branched in lower part, with long shoots, cylindrical, slender, crispate-puberulent with recurved hairs. Leaves opposite, upper leaves subsessile, others with 2–4 mm long petioles; floral leaves alternate, oblong, slightly reduced; 412 cauline leaves broadly ovate to orbicular, 8–16 mm long, 5–15 mm broad, somewhat subcordate to truncate, coarsely with crenate-dentate margin, petiolate, with sparsely hairy surface. Flowers borne singly in axils of cauline leaves, on long, filiform, sparsely hairy 1.5–4 cm long pedicels, 1.5–2 times as long as floral leaves, arcuate-nodding in fruit; upper pedicels shorter. Calyx lobes 4(5), oblong-lanceolate or lanceolate, 4–6 mm long,



2–3 mm broad, acute, equaling or 1.5 times as long as capsule, ciliate along margin, diverging in fruit; upper calyx lobes smaller. Corolla 7–11(15) mm across, sky-blue, blue or light violet, with greenish yellow throat and blue veins; lower lobe sometimes white, all lobes obtuse, 3 orbicular-reniform, 1 oval, all almost equaling or slightly exceeding calyx. Stamens curved, included, with orbicular-ovate anthers; filaments broadened in middle. Capsule 2 times as broad as long, 8–10 mm broad, 4–5 mm long, obreniform or broadly obcordate, bilobed, lobes inflated, diverging at obtuse angle and forming broad, deep sinus equaling  $\frac{1}{2}$  or  $\frac{2}{3}$  of capsule; capsule compressed on sides, distinctly reticulate-veined, with rounded base, dorsally keeled; style 2–3 mm long,  $\frac{1}{2}$  exserted from sinus. Seeds 3–12 in locule, 1.5–2.5 mm long, oblong, scaphoid-concave, shallow rugose. March to October (Plate XVII, fig. 4).

Weed from plains to high-mountain altitudes, in fields, kitchen gardens. *European USSR*: Ladoga-IImen, Baltic Region, Upper Volga, Upper Dniester, Volga-Kama, Upper Dnieper, Volga-Don, Bessarabia, Black Sea Region, Crimea, Lower Don; *Caucasus*: Ciscaucasia, Dagestan, western, eastern and southern Transcaucasia, Talysh; *Soviet Far East*: Ussuri (Vladivostok—introduced), Sakhalin (introduced); *Soviet Central Asia*: mountainous Turkmenia, Syr Darya, Pamiro-Alai, Tien Shan. *General distribution*: Central Europe, Atlantic Europe, Mediterranean Region, Balkan States-Asia Minor, Armenia-Kurdistan, Iran, India-Himalayas. Described from Soviet Near East. Type in Paris.

Section 4. *Diplophyllum* (Lehm.) Boriss. comb. nov.—Genus *Diplophyllum* Lehm. in Ges. Naturf. Fr. Berl. Mag. VIII (1814) 310 p.p.; in Zeitschr. Bot. II, 593, gruppe p.p.—*Alsinebe* Griseb. Spicil. fl. Rum. and Bith. II (1844) 23, p.p.—Terminal leaves similar to cauline, entire. Flowers 2–3 in leaf axils on erect or diverging pedicels, generally longer than bracts. Calyx flattened, with lobes connate in pairs, dentate, broader on free side in lower part. Capsule locules confluent almost to tip, broadly elliptical. Seeds 1–4 in locule, large, rugose, compressed, indented on hilum side, dorsally convex.

57. *V. crista-galli* Stev. in Mém. Soc. Nat. Mosc. III (1812) 244, 251; M.B. Fl. taur.-cauc. III, 19; Benth. in DC. Prodr. X, 487; Ldb. Fl. Ross. IV, 253; Boiss. Fl. or. IV, 468; Pflanzenfam. IV, 3b, 85; Schmalh. Fl. II, 283; Wulff in Tr. Tifl. bot. sada, XV, 136; Grossh. Fl. Kavk. III, 382; Opred. rast. Kavk. 310; Römpf in Fedde, Repert. Beih. I, 90; Stroh in Beih. Bot. Centralbl. LXI, 406.—*Diplophyllum hirsutum* Kar. and Kir. in Bull. Soc. Nat. Mosc. XV (1842) 417.—*D. crista-galli* Otto and Walp. Rep. III (1844–1845) 335.—*D. Veronicaeforme* Lehm. in Nat. Fr. Berl. Mag. VIII (1814) 311; C.A.M. Verz. Pflanz. Cauc. Casp. Meer. 107.—*lc.*:

Stev. in Trans. Linn. Soc. 11, 408, tab. 31; Vestn. Tifl. bot. sada, 28, f. 24.—*Exs.*: Fl. Cauc. exs. No. 493.

Annual. Stem weak, 10–40 cm tall, erect, partially ascending or decumbent, flexible, slender, covered with scattered hairs. Leaves sessile or short-petiolate, ovate or orbicular, 10–25(35) mm long, 8–15(30) mm broad, crenate-serrate, flabellately veined, cordate, scattered hairy along veins; lowermost leaves reniform, entire. Flowers solitary, rarely 2–3 in leaf axils. Pedicels filiform, erect or slightly curved and distant, generally exceeding bracts. Calyx compressed, 12–15 mm long, sparsely hairy, equaling or  $1/2$  as long as floral leaves, formed by 2 leaflike, ovate, dentate lobes up to 1.5 mm long, united in pairs almost up to tip, accrescent. Corolla pale sky-blue, small,  $1/2$  as long as calyx. Capsule slightly shorter than calyx, broadly elliptical 0.8–1.2 cm broad, 0.5–0.8 cm long, glabrous, rarely sparsely pubescent and ciliate along margin, obscurely emarginate, with rounded base; capsule lobes subobtuse, confluent almost up to tip, often one-seeded; style about 0.5 mm long, generally included. Seeds 3–4 mm long, ovate, ovate-orbicular or elliptical, extremely rugose, compressed, with pressed hilum in the middle of seed, dorsally convex, black when mature. April to May (Plate XVIII, fig. 1).

In shady forests, along riverbanks, forest edges and shrubby undergrowth at 600–1000 m. *Caucasus*: Ciscaucasia, Dagestan, eastern and southern Transcaucasia, Talysh. *General distribution*: Iran. Described from forest zone of Kuba District. Isotype in Leningrad.

Section 5. *Megasperma* (Lehm.) Boriss. comb. nov.—*Megasperma* Lehm. in Allgem. bot. Zeitschr. (1908) 70; Zeitschr. Bot. II, 595, gruppe.—Leaves with 3–9(11) shallow lobes, suborbicular, cordate or  
 414 reniform, often broader than long, petiolate; floral leaves almost all similar to cauline. Flowers solitary, generally on long hairy pedicels, later nodding. Calyx lobes broaden toward base, free, entire, reflexed in fruit, villous, long-ciliate. Capsule extremely inflated, globose, equaling or  $2/3$  as long as calyx, 4-partite. Seeds 1–2 in locule, large, smooth or weakly rugose, cyathiform-concave.

58. *V. hederifolia* L. Sp. pl. (1753) 13; M.B. Fl. taur.-cauc. I, 15; C. Koch, Monogr. Veron. 14; Benth. in DC. Prodr. X, 488; Ldb. Fl. Ross. III, 255; Boiss. Fl. or. IV, 468; Pflanzenfam. IV, 3b, 86; Schmalh. Fl. II, 283; Wulff in Tr. Tifl. bot. sada, XV, 149; Römpf in Fedde Repert. Beih. L, 92; Grossh. Fl. Kavk. III, 383; Stroh in Beih. Bot. Centralbl. LXI, 406.—*V. hederifolia* var. *triloba* (Opiz) Beck, Fl. Nied. Oest. (1893) 1048; Wulff l.c. 150.—*V. hederifolia triloba* Opiz, in Nachtr. zu Pohl. Tentamen Fl. Bohem. (1815) 327.—*V. triloba* Opiz, Seznam (1852) 31; Stroh, l.c.—*Cochlidiospermum hederæfolium* Opiz, l.c. 31.—*C. lappago* Opiz,

l.c. 1; in Lotos, IV, 154.—*l.c.*: Rchb. Ic. fl. Germ. XX, tab. 77; Fedtsch. and Fler. Fl. Evrop. Ross. fig. 814; Vestn. Tifl. bot. sada, 28. fig. 30; Hegi, Illustr. Fl. Mittel-Eur. VI, 1, tab. 239. f. 10; Javorka ès Csapody, Iconogr. fl. Hung. f. 3321, f. 3321a; Juel in Acta Horti Berg. 1, No. 5, tab. II, f. 36; Bibl. Bot. XXV, 93, 18, 19, 36.—*Exs.*: HFAM, No. 164; GRF, No. 1677a; Fl. exs. Reipubl. Boh.-Slov. No. 363; Pl. Finl. exs. No. 920, 921; Fl. Stir. exs. No. 1250; Fl. exs. austro-hung. No. 2632 and 2633; Fl. pol. exs. No. 225.

Annual or biennial. Roots slender. Stem 8–30(60) cm tall, decumbent, procumbent, sometimes rooting or ascending, slender, with long lateral shoots. Plant sparsely villous, sometimes more densely pubescent (f. *canescens*). Leaves petiolate, with 3–5(7) shallow lobes, suborbicular, cordate or oblong-ovate, 10–25 mm long and broad or broader than long, long-petiolate; middle lobe broader and longer than others, lateral lobes small, obtuse. Flowers solitary on long, hairy, erect pedicels, in axils of ordinary or slightly reduced leaves, almost equaling pedicels or 1/2 as long. Pedicels in fruit recurved, nodding. Calyx 3–4 mm long, deeply  
 417 parted; lobes broadly deltoid, ovate or orbicular-cordate, erect, acute, with villous-ciliate margin, accrescent and recurved in fruit. Corolla light sky-blue, blue, violet, pink or white, with 4-veined short tube, small, 2–3 mm across, shorter than calyx, with 3 subequal, ovate, obtuse lobes and 1 narrow ovate lobe. Stamens included, curved, with orbicular anthers. Capsule globose, about 6 mm broad, 5 mm long, extremely inflated, equaling or 2/3 as long as calyx, almost 4-lobed, with rounded-quadrangular lobes, glabrous, obscure emarginate or sinus absent; style short, about 1 mm long. Seeds 2.5–3 mm long, 1–2 in locule, cyathiform, notched, elliptical, weakly rugose. March to June (Plate XVIII, fig. 4).

In wastelands, on banks of rivulets, in forest glades, foothills.—*European USSR*: Baltic Region, Ladoga-Ilmen (weed), Upper Dnieper, Middle Dnieper, Upper Volga, Volga-Don, Trans-Volga Region (Kuibyshev), Black Sea Region, Crimea, Lower Don; *Caucasus*: Ciscaucasia, Dagestan, western, eastern and southern Transcaucasia; *Soviet Central Asia*: Aral-Caspian Region, mountainous Turkmenia, Syr Darya, Pamiro-Alai, Tien Shan. *General distribution*: Scandinavia, Central Europe, Atlantic Europe, Mediterranean Region, Balkan States-Asia Minor, Iran, India-Himalayas, Japan, China. Described from Western Europe. Type in London.

59. *V. cymbalaria* Bod. Mém. Veronique Cymbal. (1788) 3; Bertol. Amoen. Ital. (1798) 56; Benth. in DC. Prodr. X, 489; Ldb. Fl. Ross. III, 255; Boiss. Fl. or. IV, 467; Pflanzenfam. IV, 3b, 86; Schmalh. Fl. II, 283; Wulff in Tr. Tifl. bot. sada, XV, 148; Stroh in Beih. Bot. Centralbl. LXI, 406.—*V. cymbalariaefolia* Vahl. Enum. 1 (1805) 81. *V. cymbalariaefolia* M.B. Fl. taur.-cauc III (1819) 18, 646.—*l.c.*: Rchb. Ic. fl. germ. XX,



tab. 77, 1698, f. V; Fedtsch. and Fler. Fl. Evrop. Ross. fig. 813; Hegi, Illustr. Fl. Mittel-Eur. VI, f. 31 c-d, Javorka és Csapody, Iconogr. fl. Hung. f. 3322; Juel in Acta Horti Berg. 1, 5, tab. II, f. 35.—*Exs.*: Schulz, Herb. norm. No. 326; Fl. exs. austro-hung. No. 2634; Fl. Palaest. exs. No. 182.

Annual. Stem 10–30(60) cm tall, decumbent, soft, with shoots covered with elongated papillae. Leaves with 5–9(11) shallow obtuse lobes, semiorbicular, subcordate or reniform, with truncate or short-cuneate base, long-petiolate; middle lobe slightly larger than others. Flowers in axils of ordinary or reduced leaves, singly on long pedicels, exceeding leaves, pedicels later nodding. Calyx lobes obovate or elliptical, obtuse, narrowed toward base, ciliate, extremely diverging in fruit. Corolla light sky-blue or white, sometimes pink, scarcely exceeding calyx, with 4-veined  
418 short tube; corolla limb with 3 orbicular-ovate and 1 ovate lobes. Stamens included, curved, with ovoid anthers. Capsule extremely inflated, broader than long, 4-lobed, glabrous, covered with papillae or villous, with small sinus; style 1.2–1.5 mm long, distinctly exserted. Seeds 1–2 in locule, globose, 2.5–3 mm in diameter, weakly rugose, Cyathiform-concave. Otherwise plant similar to *V. hederifolia* L. April to May.

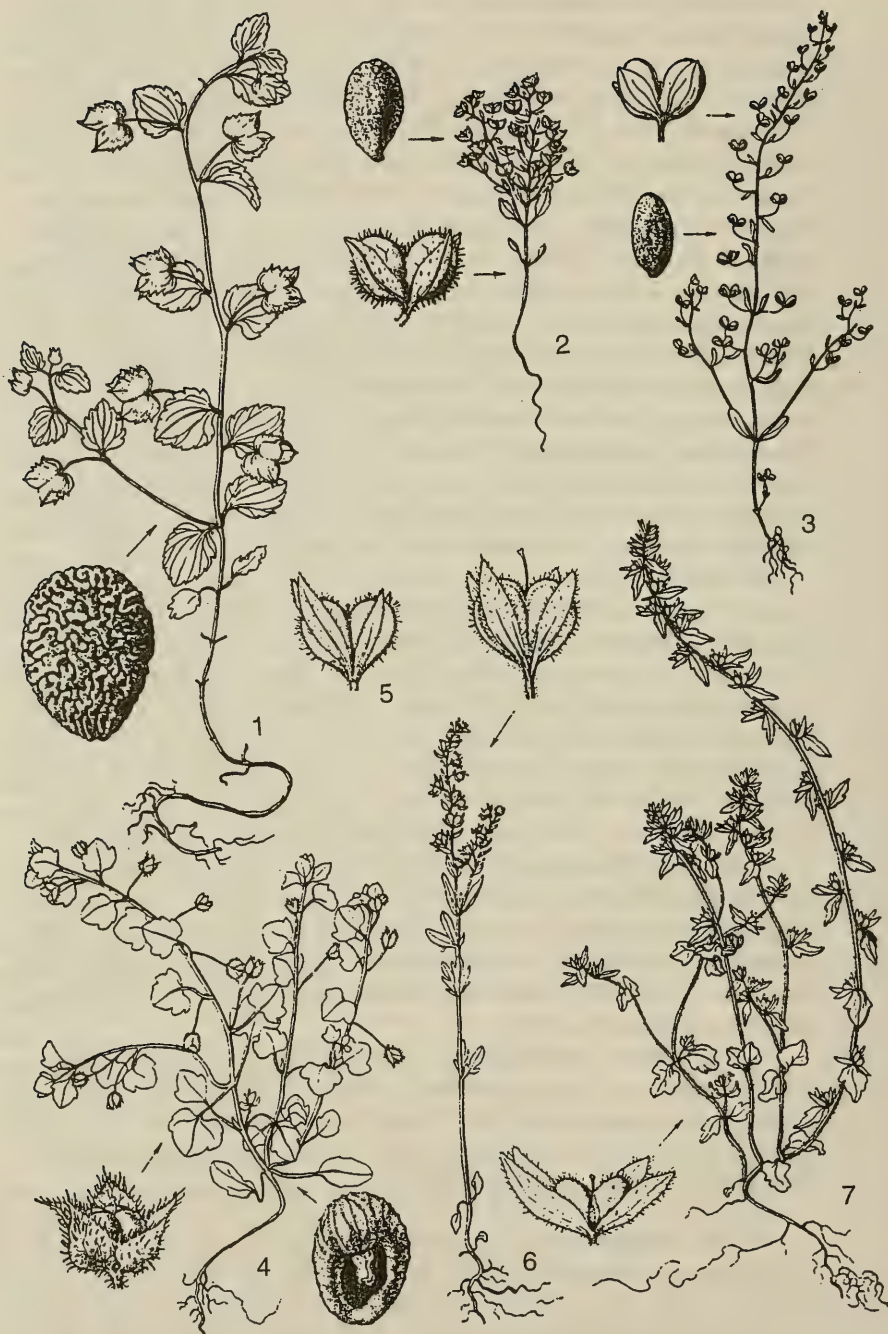
In cultivated soils, in fields. *European USSR*: Crimea, *General distribution*: Central and Atlantic Europe, Mediterranean Region, Balkan States-Asia Minor. Described from Mediterranean Region. Type in Florence (?).

Section 6. *Alsinebe* Griseb. Spicil. Fl. Rum. and Bith. II (1844) p.p.: Boiss Fl. or. IV, 436, p.p.; Lehm. in Zeitschr. Bot. II, 579, gruppe p.p.; Wulff in Tr. Tifl. bot. sada, XV, 135, p.p.; Stroh in Beih. Bot. Centralbl. LXI, 396, p.p.—Sect. *Veronicastrum* § *annuae* Benth. in DC. Prodr. X (1846) 482.—*Alsinoïdes* and *Veronicastrum* sp. Koch, Syn. fl. Germ. (1830) 530.—Sect. *Omphalospora* Bess. Enum. pl. Vohl. (1821) 8, nomen, p.p.—Flowers crowded in terminal or axillary racemes, on distinct pedicels, shorter or longer than calyx. Calyx 4-lobed. Corolla rotate. Capsule compressed on sides or inflated and slightly compressed, often emarginate; capsule valves confluent with placental column, dehiscence loculicidal. Seeds flat, biconvex. Cauline leaves opposite; floral leaves alternate, similar to cauline.

Series 1. *Microspermae* Lehm. in Zeitschr. Bot. II (1910) 60 gruppe.—Racemes terminal, sometimes lateral. Pedicels shorter than calyx or slightly longer, always erect. Calyx lobes parted up to base into 2 unequal pairs of lobes, exceeding corolla, rarely equaling it. Capsule obcordate, compressed. Seeds 4–6(10) in locule, minute, plano-convex.

60. *V. arvensis* L. Sp. pl. (1753) 13; M.B. Fl. taur. cauc. I, 1; C. Koch, Monogr. Veron. 13; Benth. in DC. Prodr. X, 483; Ldb. Fl. Ross, III, 249; Boiss. Fl. or. IV, 457; Pflanzenfam. IV, 3b, 85; Schmalh. Fl. II, 280; Wulff in Tr. Tifl. bot. sada, XV, 143; Römpf in Fedde Repert. Beih.





L, 75; Grossh. Fl. Kavk. III, 391; Stroh in Beih. Bot. Centralbl. LXI, 401.—*V. brevipedunculata* Gilib. Fl. lith. 1 (178) 119.—*V. hirsuta* Lucé Topogr. Nachr. Ösel (1823) 5.—*V. micrantha* Schur, Enum. pl. transs. (1866) 978.—*Id.*: Rchb. Ic. fl. Germ. X, tab. 99, 1720, f. II; Fedtsch. and Fler. Fl. Evrop. Ross. fig. 805; Vestn. Tifl. bot. sada, 28, fig. 19; Syreitsch. Fl. Mosk. gub. p. III, 15; Hegi, Illustr. Fl. Mittel-Eur. VI, 1, 419 tab. 239, f. 5; Javorka és Csapody, Iconogr. fl. Hung. f. 3314; Sorn. rast. SSSR. IV, fig. 415; Sugawara, Fl. Saghal. IV, 1649, tab. 756 B.—*Exs.*: GRF, No. 1675; HFAM, No. 158; Pl. Finl. Exs. No. 918, 1306; Fl. pol. exs. No. 62.

Annual or biennial. Roots slender. Plant without trailing vegetative shoots, with 2 rows of hairs below, glandular above, patently pubescent. Stem 5–30 cm tall, simple or with spreading branches, weak, slender, erect or partially ascending. Leaves alternate or opposite, in 2–3(4) pairs, 5–13(20) mm long, 4–10 mm broad, cordate-ovate, entire, 3–5-veined; lower leaves with 1–4 mm long petioles, upper sessile, gradually transforming into bracts; cauline leaves entire, dentate or crenate, obtuse, with rounded or subcordate base, glabrous or scattered hairy. Racemes generally many-flowered, terminal; axillary racemes sometimes developing, dense at first, elongated and lax in fruit. Bracts oblong-lanceolate or lanceolate to linear, obtuse, entire or ovate-lanceolate with a few teeth at base, almost equaling or more than 2 times as long as flowers. Pedicels 0.5–1 mm long, 1/2–2/3 as long as calyx, elongated in fruit, becoming longer than calyx and bracts. Calyx 3–4 mm long, glandular-pubescent, parted almost up to base into 4 lanceolate or linear-lanceolate, obtuse lobes, of which 2 are larger than others, with 1 distinct vein and obscure lateral veins, equaling or 2 times as long as capsule. Corolla pale sky-blue, 1.5–2(3–5) mm long, with 2 broadly ovate obtuse lobes, 1 ovate-reniform and 1 oblong lobes; corolla tube very short, 5-veined. Stamens with short filaments, much shorter than corolla. Capsule 3–4 mm long, shorter than calyx, compressed, obcordate, bilobed, with rounded lobes, acute or obtuse, deep sinus, 1/4 or 1/3 as long as capsule, subcuneate as base, ciliate along margin, glandular-pubescent; style almost equaling sinus or reaching 1/2 its length. Seeds numerous, ovate, yellowish, smooth or weakly transversely

#### Plate XVIII.

*Veronica crista-galli* Stev., general appearance of plant, seed.—2. *V. rubrifolia* Boiss., general appearance of plant, capsule, seed.—3. *V. acinifolia* L., general appearance of plant, capsule, seed.—4. *V. hederifolia* L., general appearance of plant, capsule, seed.—5. *V. verna* L., capsule.—6. *V. dillenii* Crantz, general appearance of plant, capsule.—7. *V. arvensis* L., general appearance of plant, capsule.

rugose, about 1 mm long, about 0.5 mm broad, with small hilum in middle. March-April-September (Plate XVIII, fig. 7).

Weed in fields, rarely on dry slopes, in sandy-pebbly soils, on loess mounds of foothills, up to 2000 m. *European USSR*: Karelia-Lapland, Dvina-Pechora, Baltic Region, Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Trans-Volga Region, Bessarabia, Crimea (?), Black Sea Region, Lower Don; *Caucasus*: Ciscaucasia, Dagestan, western, eastern and southern Transcaucasia, Talysh; *Soviet Far East*: Sakhalin; *Soviet Central Asia*: Balkhash Region, Dzh.-Tarbagatai, Syr Darya, Pamiro-Alai, Tien Shan, mountainous Turkmenia. *General distribution*: Scandinavia, Central Europe, Atlantic Europe, Mediterranean Region, Balkan States-Asia Minor, India-Himalayas, Japan. Described from Western Europe. Type in London.

- 420 61. *V. peregrina* L. Sp. pl. (1753) 14; C. Koch, Monogr. Veron. 33; Benth. in DC. Prodr. X, 482; Ldb. Fl. Ross. III, 249; Pflanzenfam. IV, 3b, 85; Schmalh. Fl. II, 279; Kom. and Alis. Opred. rast. Dalnevost. kr. II, 923; Römpf in Fedde, Repert. Beih. L, 77; Stroh in Beih. Bot. Centralbl. LXI, 402.—*V. romana* L. Sp. pl. (1753) 14.— *Ic.*: Rchb. Ic. fl. Germ. XX, tab. 98, 1719; Fedtsch. and Fler. Fl. Evrop. Ross. fig. 807; Hegi, Illustr. Fl. Mittel-Eur. IV, 1, f. 30 a-b; Javorka ès Csapody, Iconogr. fl. Hung. f. 3313.— *Exs.*: Pl. Finl. exs. No. 1305, Fl. exs. austro-hung. No. 2624.

Annual. Roots slender, short. Stem (5)10–25(30) cm tall, weak, often partially ascending or decumbent, glandular-puberulent or glabrous, simple or branched in lower part. Leaves 1–2.5 cm long, 3–5 mm broad, glabrous, sessile; upper leaves lanceolate or lanceolate-linear, lower leaves obovate-oblong or oblong-lanceolate, entire or obscurely sinuate-dentate, cuneate, narrowed into broad petiole, spaced. Racemes terminal, glandular or not. Bracts obtuse, spatulate, linear to lanceolate, generally entire, rarely obscurely dentate, much (about 2 times) exceeding flowers and fruit. Pedicels shorter than calyx. Calyx exceeding corolla, with rhombic-lanceolate, glabrous lobes, almost equaling or 1.5 times as long as capsule. Corolla white or pale sky-blue, 3–5 mm long, with subequal oval lobes. Stamens with filaments 1/4–1/3 as long as corolla. Capsule about 4 mm broad, 3–4 mm long, compressed, glabrous, angular, obcordate or orbicular, subcuneate, obscurely emarginate, shorter than calyx, many-seeded; style about 1 mm long, included. Seeds about 1 mm long, elliptical, smooth. May to June.

Along muddy banks and flats, in marshy and inundated places, near ditches, in gardens and vineyards. *European USSR*: Baltic Region (introduced); *Eastern Siberia*: Dauria; *Soviet Far East*: Ussuri



(along Amur and Ussuri rivers). *General distribution*: Scandinavia, Central Europe, Japan, China. Described from Europe. Type in Berlin.

62. *V. dillenii* Crantz, Strip. Austr. IV (1769) 352; Wulff in Tr. Tifl. bot. sada, XV, 146; Römpf in Fedde, Repert. Beih. L, 77; Grossh. Fl. Kavk. III, 391; Stroh in Beih. Bot. Centralbl. LXI, 401.—*V. verna* var. *dillenii* (Crantz) Fedtsch. in Fedtsch. and Fler. Fl. Evrop. Ross. (1910) 862.—*V. verna* var. *campestris* Schmalh. Fl. yugo-zap. Ross. (1886) 433.—*V. campestris* Schmalh. in Ber. Deutsch. Bot. Ges. 10 (1892) 291; Schmalh. Fl. II, 280.—*V. acinifolia* Schmalh. Fl. II (1897) 280. p.p. non L.—*lc.*: Schmalh. in Ber. tab. 16. f. 12, 14, 16; Fedtsch. and Fler. l.c. fig. 84; Vestn. Tifl. bot. sada, 28, fig. 25; Hegi, Illustr. Fl. Mittel-Eur. IV, I, fig. 29 a-d; Javorka ès Csapody, Iconogr. Fl. Hung. f. 3311.—*Exs.*: 421 GRF, No. 278; Gerb. Fl. sov. Ukr. No. 92; Fl. Siles. exs. No. 1137, 881; Fl. exs. austro-hung. No. 2623.

Annual or biennial. Stem 10–20 cm tall, glandular, crispate hairy below, patently pubescent above, erect, terminating into inflorescence, branched mainly in upper part. Middle cauline leaves deeply incised into 5–7 lobes, with apical lobe larger, cuneate at base; upper cauline leaves entire, lanceolate-linear; floral leaves linear, entire, markedly different from cauline leaves. Flowers in many-flowered, lax, short, racemose inflorescence on pedicels shorter than calyx and bracts. Calyx exceeding capsule, with unequal lanceolate lobes, sparsely glandular-hairy. Corolla equaling calyx, sky-blue or dark blue, 4.5–5 cm [sic] across, upper lobe broad, orbicular-reniform, lower lobe lanceolate, 2 lateral lobes broadly ovate. Stamens included. Capsule orbicular-obcordate, with 18–26 seeds, shallowly emarginate, sparsely glandular-hairy; style much exceeding sinus, 0.9–1.1 mm long, equaling 1/2 length of capsule septum. Seeds flat, ovate, peltate, 1 mm long, 0.75 mm broad. April to June (Plate XVIII, fig. 6).

In dry meadows, pine forests, fields, on stony slopes. *European USSR*: Baltic Region (?), Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Black Sea Region, Lower Don, Lower Volga, Crimea; *Caucasus*: Ciscaucasia, southern and eastern Transcaucasia; *Western Siberia*: Upper Tobol, Irtysh, Altai Mountains; *Soviet Central Asia*: Aral-Caspian Region, Balkhash Region, Dzh.-Tarbagatai. *General distribution*: Scandinavia, Central and Atlantic Europe, Mediterranean Region, Balkan States-Asia Minor, Iran. Described from Southern Europe. Type in Vienna.

63. *V. verna* L. Sp. pl. (1753) 14; M.B. Fl. taur.-cauc. I, 17; C. Koch, Monogr. Veron. 11; Benth. in DC. Prodr. X, 483; Bge. in Ldb. Fl. alt. I, 41; Fl. Ross. III, 250; Boiss. Fl. or. IV, 456; Pflanzenfam. IV, 3b, 85; Schmalh. Fl. II, 280; Wulff in Tr. Tifl. bot. sada, XV, 145; Römpf in Fedde, Repert. Beih. L, 76; Kryl. Fl. Zap. Sib. X, 2451; Stroh in Beih.



Bot. Centralbl. LXI, 401.—*V. trifida* Gilib. Fl. lith. (1781) 121.—*lc.*: Hegi, Illustr. Fl. Mittel-Eur. IV, 1, f. 29; Javorka ès Csapody, Iconogr. fl. Hung. f. 3310; Syreitsch. III, fl. Mosk. gub. III, 156.—*Exs.*: GRF, No. 1680; Pl. Finl. exs. No. 1307; Fl. pol. exs. No. 762°.

Annual or biennial. Roots slender. Plant light green, glandular-hairy above. Stem 5–15(30) cm tall, erect, without axillary vegetative shoots, patently pilose, sometimes glandular, simple or branched, leafy, sometimes reddish. Lower leaves short-petiolate, ovate, crenate or subentire, early shedding; middle cauline leaves sessile, pinnatifid, with 5–7 linear or elongated oblong, obtuse lobes, with middle lobe larger, cuneate at base, 5–12 mm long, 4–7 mm broad, coarsely crenate; upper leaves entire, lanceolate-linear, gradually transforming into 3-partite bracts with linear entire lobes; upper bracts entire. Flowers (10)20–30, in elongated terminal and axillary many-flowered, dense, spicate racemes, later elongated and lax. Pedicels generally shorter than bracts and slightly shorter than calyx. Calyx with 4 linear-lanceolate, 1-veined lobes, 2–3 times as long as capsule; calyx lobes sometimes unequal in pairs, almost equaling corolla. Corolla 1.8–3 mm across, 1/2 as long as calyx, pinkish sky-blue or pale sky-blue, with blue stripes. Capsule 3 mm long, 4 mm broad, flat, broadly obcordate, with 15 seeds, rounded lobes, generally with cuneate base, shallow obtuse sinus, 1/4 as long as capsule; capsule margin glandular-ciliate; style included or scarcely exerted, 0.5 mm long. Seeds 1 mm long, ovate or orbicular, planoconvex, not sinuate, yellowish, 4–6(10) in locule. March to July (Plate XVIII, fig. 5).

In dry meadows, on stony slopes, on sandy-pebbly terraces, in wastelands; found in mixed-grass steppe in mountains up to 2100 m. *European USSR*: Karelia-Lapland, Dvina-Pechora, Baltic Region, Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Trans-Volga Region, Black Sea Region, Crimea, Bessarabia, Lower Don, Lower Volga; *Caucasus*: Ciscaucasia, Dagestan, western, eastern and southern Transcaucasia; *Western Siberia*: Irtysh, Altai mountains; *Soviet Central Asia*: Aral-Caspian Region, Balkhash Region, Dzh.-Tarbagatai, mountainous Turkmenia, Pamiro-Alai, Tien Shan. *General distribution*: Central and Atlantic Europe, Mediterranean Region, Balkan States-Asia Minor, Iran, India-Himalayas. Described from Sweden. Type in London.

*Note.* Gruner has recognized *V. verna* var. *simplex* Gruner (from Voronezh Region) with slender, simple stems and entire cauline leaves.

*Series 2. Rugosae* Boriss.—Plant glandular-pubescent. Racemes terminal, lax. Bracts similar to cauline leaves. Pedicels exceeding calyx. Calyx with 4 unequal lobes, shorter than corolla. Capsule orbicular-ovate, with oblong-ovate lobes converging at acute angle. Seeds planoconvex, rugose, about 1 mm long.

64. *V. turkmenorum* B. Fedtsch. in Fl. Turkm. VI (1954) 273.—*l.c.*: B. Fedtsch. l.c. Plate XXXVII.

Annual. Root slender. Stems branched from base, slender, stout, numerous, erect or procumbent, 5–15 cm tall, glandular-puberulent, leafy. Leaves opposite, spaced, with 3–4(7) mm long petioles, upper leaves subsessile, ovate or orbicular-ovate, 5–15 mm long, 4–10 mm broad in lower part, obtuse, with truncate cuneate base, coarsely crenate-dentate, lighter beneath. Raceme long, lax, terminal. Pedicels slender, 2 times as long as calyx, glandular-pubescent, along with inflorescence axis. Bracts similar to cauline leaves, gradually reducing upward. Calyx 4-partite, with oblong-lanceolate, obtuse, sparsely glandular-hairy lobes, similar in pairs, about 5 mm long; 2 anterior lobes broader and longer than posterior. Corolla blue, about 8 mm across, with short tube; corolla limb rotate, with 3 rounded and 1 ovate lobes. Stamens included. Capsule slightly exceeding or equaling calyx, orbicular-ovate, 5–7 mm long, 4–6 mm broad, with oblong-ovate lobes, 1/3 diverging at acute angle, with isolated glandular hairs, largely along margin; style slender, erect, 1/2 as long as capsule, 2 times as long as sinus. Seeds slightly over 1 mm long, ovate, obtuse above, dorsally convex and rugose, flat on other side, with rounded hilum in middle and rugose along margin. Flowering July; Fruiting August.

On stony slopes in ravines, near snowbanks and springs at about 2300 m.—*Soviet Central Asia*: mountainous Turkmenia (Kopet-Dag Range, middle section). Endemic. Possibly originating from Iran. Described from Central Kopet-Dag. Type in Leningrad.

Series 3. *Filiformes* Boriss.—Plants glabrous or sparsely crispate-pubescent. Floral leaves similar to cauline; all leaves entire. Flowers solitary. Pedicels long, much exceeding leaves, slender, nodding in fruit. Capsule reticulate-rugose, broader than long. Seeds somewhat flat, rugose.

65. *V. filiformis* Smith in Trans. Linn. Soc. Lond. I (1791) 195; M.B. Fl. taur-cauc. I. 15, p.p.; III, 17. p.p.; Benth. in DC. Prodr. X, 478; C. Koch, Monogr. Veron. 12; Ldb. Fl. Ross. III, 251; Boiss. Fl. or. IV, 466; Pflanzenfam. IV, 3b, 85; Schmalh. Fl. II, 282; Fedtsch. and Fler. Fl. Evrop. Ross. 864; Wulff in Tr. Tifl. bot. sada, XV, 162; Grossh. Fl. Kavk. III, 383; Stroh in Beih. Bot. Centralbl. LXI, 405.—*V. filiformis*  $\beta$ . *macrantha* Bordz. ex Wulff, l.c.; Stroh, l.c.—*V. filiformis* var. *subabortiva* Reynier in Fedde, Repert. 8 (1910) 33.—*l.c.*: Rchb. Ic. fl. Germ. tab. 644; Vestn. Tifl. bot. sada, 28, fig. 20.—*Exs.*: Fl. Cauc. exs. No. 168; GRF, No. 781, 3235.

Annual or perennial. Plant sparsely crispate-hairy or glabrous. Stem weak, slender, partially ascending, 10–30 cm long, branched, with numerous, slender, elongated, rooting branches. Upper leaves alternate, lower opposite, ovate or orbicular, (3)5–10(15) mm long and broad, short-petiolate,

- 424 coarsely crenate, obtuse, with subcordate or rounded base, scattered hairy with isolated flat hairs or glabrous; floral leaves reduced, similar to cauline. Flowers borne singly on slender pedicels, 2–4 times as long as leaves, nodding or weakly bent in fruit, generally patently hairy, in axils of ordinary or slightly reduced leaves. Calyx lobes elliptical or lanceolate, 2.5–4 mm long; subacute, slightly diverging at tips, diffusely glandular. Corolla sky-blue or whitish, exceeding calyx, 8–13 mm across; 3 corolla lobes reniform or orbicular, subequal, lower lobe obovate,  $\frac{2}{3}$  as broad as others; corolla tube very short. Stamens included. Capsule inflated, orbicular-cordate, bilobed; lobes rounded, joining at acute or right angle, slightly diverging, connate up to near tip, generally with narrow sinus, diffuse-glandular, finely reticulate, about 5 mm broad, 4 mm long; style generally 2 times as long as sinus, about 4 mm long. Seeds 8–10 in locule, elliptical to oblong, flat, about 1 mm long, weakly tuberculate-rugose or smooth. June to August.

In shady mountain forests and meadows, at altitudes of 1000–2400 m. Sometimes growing as weed; rarely found in plains. *European USSR*: Crimea (Yalta, introduced); *Caucasus*: Ciscaucasia, Dagestan, western, southern and eastern Transcaucasia, Talysh. *General distribution*: Central and Atlantic Europe, Balkan States-Asia Minor, Armenia-Kurdistan, Iran. Described from Caucasia. Type in London.

66. *V. ceratocarpa* C.A.M. Verz. Pflanz. Cauc. Casp. Meer (1831) 106; Benth. in DC. Prodr. X, 485; Ldb. Fl. Ross. III, 251; Boiss. Fl. or. IV, 460; Schmalh. Fl. II, 281; Wulff in Tr. Tifl. bot. sada, XV, 142; Grossh. Fl. Kavk. III, 391; Stroh in Beih. Bot. Centralbl. LXI, 405.—*V. reticulata* C. Koch in Linnaea, XXII (1849) 702; XXIII, 552.—*lc.*: Vestn. Tifl. bot. sada, 28, fig. 26; Juel in Acta Horti. Berg. 1, No. 5, tab. II, f. 21.—*Exs.*: Fl. Cauc. exs. No. 492; Fl. exs. austro-hung. No. 2628.

- Annual. Plant sparsely crispate-hairy, 14–30 cm tall, with elongated, weak, spreading branches, arising from profusely branched base. Leaves short-petiolate, ovate to oblong, 0.5–2 cm long, 0.3–1.5 cm broad, with subcuneate or rounded base, sparsely diffusely pubescent surface. Flowers in leaf axils on filiform replicate or nodding pedicels up to 25 mm long, 4–5 times as long as calyx and 2–3 times as long as bracts at fruiting stage. Calyx with lanceolate or oblong-lanceolate, acute or obtuse lobes united at base, slightly longer than or equaling capsule, sparsely puberulent; calyx lobes in fruit recurved. Corolla pale sky-blue, 8–10 mm across, slightly exceeding calyx, with short tube and 5 veins; limb with 3 orbicular and 1 ovate obtuse lobes. Stamens included, with black anthers, slightly diverging at base, on thickened curved filaments. Capsule almost drooping, compressed, sparsely hairy, pubescent or glabrous and ciliate only along margin, reticulate-rugose due to thick bulging veins, about 10 mm broad,
- 425



5 mm long, bicornate, with curved, oblong-lanceolate, obtuse lobes, diverging at right or obtuse angle above middle; style about 0.5 cm long, exserted from obtuse sinus; capsule chambers with 2–3 seeds. Seeds somewhat flat, deltoid-orbicular or ovate, 2–3 mm long, radially rugose, with pressed hilum. April to May (Plate XVII, fig. 3).

Dry meadows, shrubby thickets, along ravines in mountains up to 1800 m. *Caucasus*: Dagestan, western, eastern and southern Transcaucasia, Talysh. *General distribution*: Iran, Europe (introduced). Described from Lenkoran. Type in Leningrad.

Series 4. *Acinifoliae* Lehm. in Zeitschr. Bot. II (1910) 598, p. p.—Cauline leaves different from bracts. All leaves entire. Inflorescence slightly separated from rest of plant. Pedicels erect or diverging, generally many times longer than calyx. Capsule deeply bilobed, with narrow or obtuse sinus. Seeds 7–10 in locule, flat, smooth.

67. *V. perpusilla* Boiss. Diagn. pl. or. I, 7(1846) 43; Benth. in DC. Prodr. X. 490.—*V. nudicaulis* Kar. and Kir. in Bull. Soc. Nat. Mosc. XV (1842) 415, non Lam. (1805); Benth in DC. Prodr. X, 486; Ldb. Fl. Ross. III, 252; Boiss. Fl. or IV, 458; Wulff in Tr. Tifl. bot. sada, 167.—*V. acinifolia* Römpp in Fedde, Repert. Beih. L (1929) 63, p.p. non L.—*V. acinifolia* var. *karelini* and var. *glabrata* Trautv. in Bull. Soc. Nat. Mosc. 39, 2 (1866) 439.—*V. acinifolia* var. *nudicaulis* (Kar. and Kir.) Römpp, l.c.; Stroh in Beih. Bot. Centralbl. LXI, 398.

Annual. Root slender. Plant diffusely puberulent in upper part or glabrous. Stem 2–12(20) cm tall, filiform, almost simple or branched below. Leaves opposite, 3–5 mm long, 1–2.5 mm broad, entire, oblong or oblong-ovate, glandular ciliate along margin, narrowed toward base, subsessile; lower leaves with 1–2 mm long petioles, obtuse, lower leaves generally withering; floral leaves oblong, narrowed toward base, broadened above, upper ones sublinear, equaling pedicels or shorter, hairy along margin, especially toward base. Racemes few-flowered, short or somewhat elongated, lax, with spaced fruit. Flowers solitary in leaf axils. Pedicels shorter than leaves, curved and diverging in fruit, 1.5–3 times as long as calyx and bracts, with scattered, glandular, patent hairs. Calyx incised almost up to base, glabrous or glandular-ciliate, with linear-lanceolate or oblong-ovate, obtuse or subobtuse lobes with 1 or 3 veins; midrib generally dark, lateral veins obscure. Corolla shorter than or equaling calyx, pale sky-blue. Capsule 4–5 mm broad, about 3 mm long, reniform-obcordate, glabrous, diffusely glandular or ciliate only along margin, compressed, bilobed, 2/3 connate; capsule lobes orbicular-ovate, diverging; locule with 4–5 seeds; style 1/2 as long as sinus. Seeds flat, elliptical, about 1 mm long, 0.5 mm broad, inserted at base. Flowering from April to June.



Along banks of rivers, lakes and marshes, in sandy-pebbly soils of riverine terraces and rangelands; from foothills to alpine zone.—*European USSR*: Volga-Kama (Zilairsk Cant.) Crimea; *Caucasus*: eastern and southern Transcaucasia; *Western Siberia*: Upper Tobol, Irtysh; *Soviet Central Asia*: Aral-Caspian Region (Akmolinsk, Mangyshlak), Dzh.-Tarbagatai, mountainous Turkmenia, Tien Shan, Pamiro-Alai. *General distribution*: Iran, Described from Iran. Type in Geneva, isotype in Leningrad.

*Note*: Var. *glabrata* Trautv. [Bull. Soc. Mosc. XXXIX (1855) 439; Fl. Zap. Sib. X, 2453], characterized by small, entire, oblong leaves, pedicels diverging in fruit, a very short style and larger seeds has been recognized.

68. *V. minima* C. Koch in Linnaea, XXII (1849) 700; Grossh. Fl. Kavk. III, 390.—*V. biloba* var. *minima* C. Koch in Linnaea, XVII (1843) 288; Wulff in Tr. Tifl. bot. sada, XV, 138.—*V. hispidula* Boiss. and Huet. Diagn. Pl. or. II, 3 (1856) 172; Boiss. Fl. or. IV, 460; Römpf in Fedde, Repert. Beih. L, 64; Stroh in Beih. Bot. Centralbl. LXI, 399.—*V. nudicaulis* var. *eglandulosa* Ldb. Fl. Ross. III (1847–1849) 252.—*V. ixodes* Boiss. and Bal. Diagn. Pl. or. II, 3 (1856) 172.

Annual. Stem simple or branched, 2–10(15) cm tall, erect, slender, puberulent or subglabrous. Cauline leaves sessile, often in 2 distant pairs, oblong or lanceolate, 4–8 mm long, 2–3 mm broad, entire, puberulent or glabrous; floral leaves narrowed toward base, 1–5 times as long as pedicels. Flowers 3–6, small. Calyx parted almost up to base into 4 oblong-lanceolate, glabrous or subglabrous lobes, almost equaling  
429 pedicels, slightly shorter than capsule. Corolla slightly exceeding calyx. Capsule glabrous, bilobed, 3–4 mm long, about 5 mm broad, with lobes connate almost up to middle; style 1/2 as long as sinus. Seeds 8–10 in locule, plano-convex, elliptical, about 1 mm long. Flowering in May.

In alpine zone. *Caucasus*: southern Transcaucasia. *General distribution*: Armenia-Kurdistan, Balkan States-Asia Minor. Described from eastern foothills of Alagez mountain. Type in Berlin.

69. *V. acinifolia* L. Sp. pl. (1762) 19; C. Koch, Monogr. Veron. 11; Benth. in DC. Prodr. X, 484; Ldb. Fl. Ross. III, 252; Boiss. Fl. or. IV, 458; Pflanzenfam. IV, 3a, 85; Schmalh. Fl. II, 280, p.p.; Wulff in Tr. Tifl. bot. sada, XV, 141; Römpf in Fedde, Repert. Beih. L, 63 p.p.; Grossh. Fl. Kavk. III, 392; Stroh in Beih. Bot. Centralbl. LXI, 398.—*V. acinifolia* L. var. *typica* Trautv. in Tr. Bot. sada, VII (1881) 494.—*V. romana* Georgi, Beschr. Russ. Reich. III, 4 (1800) 652.—*V. gorumensis* Boiss. and Kotschy ex Boiss. Fl. or. IV (1879) 458.—*V. coniosperma* Wallr. in Linnaea, 14 (1840) 533.—*Inc.*: Rchb. Ic. fl. germ. XX, tab. 98, 1719, II; Fedtsch. and Fler. Fl. Evrop. Ross. fig. 806; Hegi, Illustr. Fl. Mittel-Eur. IV, 1. f. 29,

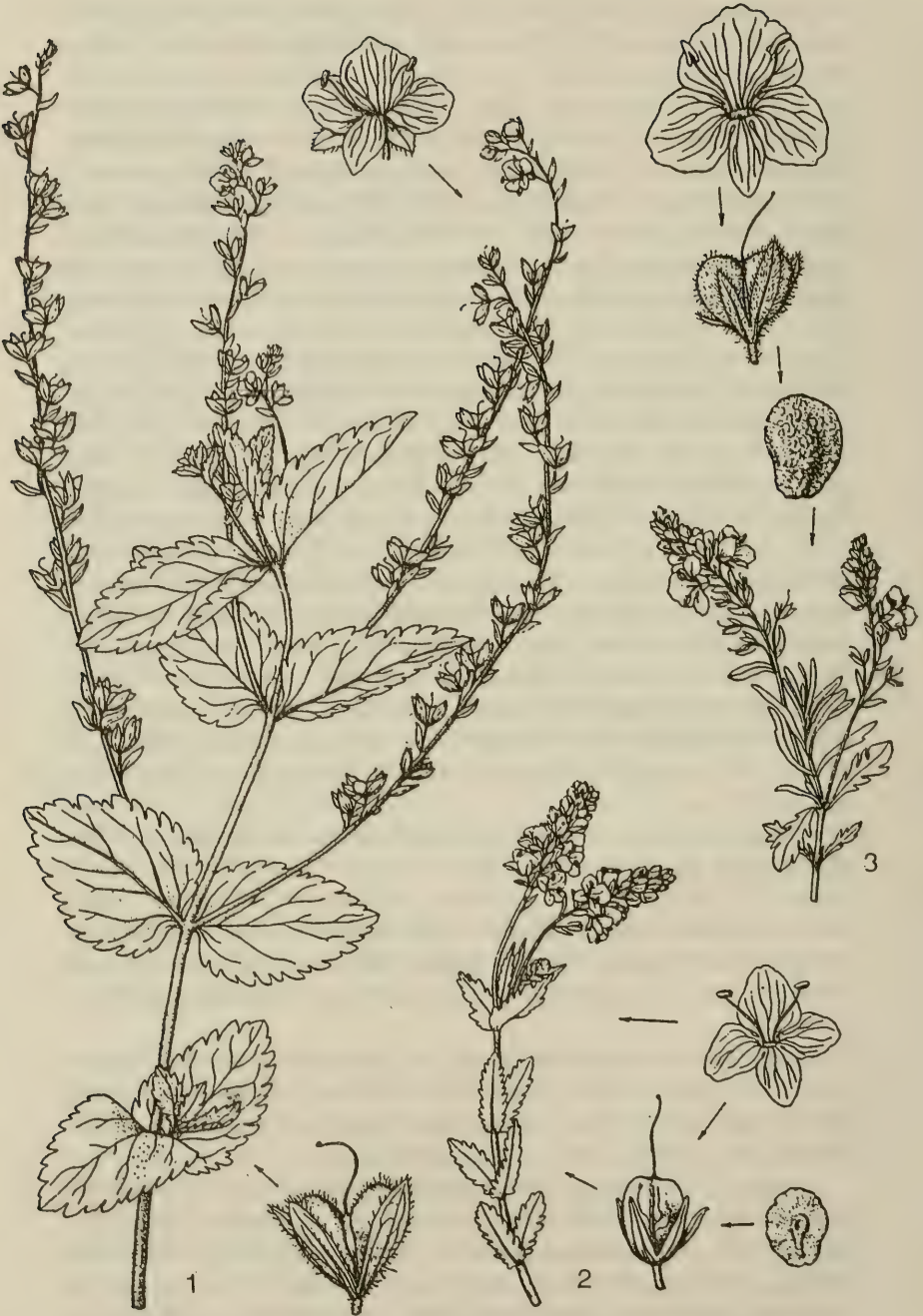
f-h; Javorka ès Csapody, Iconogr. fl. Hung. f. 3312; Juel in Acta Horti Berg. 1, 5, tab. II, f. 30.—*Exs.*: Fl. exs. austro-hung. No. 2626; Fl. Ital. exs. No. 1121.

Annual. Roots slender, short. Plant without vegetative shoots, (5)8–20(25) cm tall, glandular-hairy. Stems simple or branched, lateral branches ascending, others erect. Leaves crenate or entire, generally glandular-pubescent or glabrous; lower leaves short-petiolate, upper sessile, ovate or suborbicular, 6–10 mm long, 3–6 mm broad, obtuse or emarginate rounded or short-cuneate at base; upper leaves gradually transforming into leaflike bracts, lower leaves into elliptical or oblong-lanceolate bracts, gradually attenuating from both ends, entire or dentate. Upper bracts lanceolate. Inflorescence indiscernibly demarcated; flowers in terminal, sometimes in lateral racemes. Pedicels slender, equaling or 2 times as long as bracts, 2–4 times as long as calyx in fruit, erect or slightly curved, glandular. Calyx slightly shorter than capsule; lobes oblong to broadly lanceolate, subobtus, diffusely glandular along margin. Corolla larger than calyx, deep sky-blue, with dark veins, yellowish in throat, with broad, orbicular-reniform upper lobe, 2 lateral orbicular-ovate lobes and 1 lower subacute, oblong and the smallest lobe; corolla tube very short, with 4 veins. Stamens almost equaling corolla or included, somewhat curved. Capsule broader (4–6 mm) than long, glandular, compressed, 430 exceeding calyx, bilobed almost up to middle, with rounded lobes, diverging at acute angle, with narrow acute sinus, glandular-ciliate along margin; style equaling sinus. Seeds 7–8 in locule, flat, peltate, oval, about 0.5 mm long, smooth, with hilum in middle. April to June (Plate XVIII, fig. 3).

On grassy slopes, in moist, low-lying soils, on pebble beds, in fields, among crops and in vineyards, up to 1500 m. *European USSR*: Baltic Region (?), Crimea (Yalta); *Caucasus*: Ciscaucasia, eastern and southern Transcaucasia, Talysh. *General distribution*: Central and Southern Europe, Mediterranean Region, Balkan States-Asia Minor, Armenia-Kurdistan, Iran, India-Himalayas. Described from Western Europe. Type in London.

*Note*. Besides the glandular form, an eglandular, pubescent form is found in Crimea, having a capsule with the lobes connate almost up to tip and with a short style. Capsule about 3 mm long and broad, with a cuneate base. This form may be a separate race.

Section 7. *Chamaedrys* Griseb. Spicil. fl. Rum. and Bith. II (1844) 28; Benth. in DC. Prodr. X, 469; Pflanzenfam. IV, 3b; 86; Wulff in Tr. Tifl. bot. sada, XV, 97.—*Chamaedryos* Koch, Syn. fl. Germ. (1837) 524.—Racemes axillary, opposite, sometimes solitary, alternate, lax. Flowers distinctly pedicellate. Bracts small, very rarely lower bracts similar to leaves. Calyx 4- or 5-partite. Corolla with very short tube, rotate. Capsule extremely





compressed on sides with valves connate up to the apex, adnate to placental column, very often emarginate, loculicidal. Seeds 2–10 in locule, compressed, flat, biconvex or scaphoid. Perennial herbs, sometimes woody at base and often caespitose, trailing, partially ascending or erect, with spreading branches, somewhat pubescent. Leaves opposite, not fleshy:

*Subsection 1. Planiconvexae* Boriss.—Seeds flat or biconvex.

*Series 1. Euchamaedrys* Riek in Fedde, Repert. LXXIX (1935) 10.—Stem partially ascending at base, or trailing and rooting. Leaves orbicular to oblong-ovate, sessile or short-petiolate. Calyx 4-partite. Capsule compressed, broader than long, with cuneate or rounded base, broadly emarginate, shorter than calyx. Seeds trigonous, biconvex or somewhat flat.

- 431 70. *V. chamaedrys* L. Sp. pl. I (1753) 13; M.B. Fl. taur.-cauc. I, 11; C. Koch, Monogr. Veron. 17; Benth. in DC. Prodr. X, 474; Ldb. Fl. Ross. III, 243, p.p.; Boiss, Fl. or. IV, 446; Pflanzenfam. IV, 3b, 86; Schmalh. Fl. II, 275; Wulff in Tr. Tifl. bot. sada, XV, 110; Römpf in Fedde, Repert. Beih. L, 131; Kryl. Fl. Zap. Sib. X, 2560; Riek in Fedde, Repert. Beih. LXXIX, 56; Keller in Bot. Közl. XXXVII, 3–4, 152; Stroh in Beih. Bot. Centralbl. LXI, 233.—*V. chamaedrys* L.  $\alpha$ . *legitima* Ldb. l.c. (1847–1849) 243.—*V. chamaedrys*  $\beta$ . *pilosa* Benth. in DC. l.c. (1846) 475; Ldb. l.c.—*V. pilosa* L. Sp. pl. (1763) 1663.—*Veronicella chamaedrys* Fourr. in Ann. Soc. Linn. Lyon. N. S. XVIII (1869) 128—*l.c.*: Rchb. l.c. Fl. Germ. XX, tab. 83, 1704, f. II; tab. 212, 1833, f. II; Fedtsch. and Fler, Fl. Evrop. Ross. fig. 820; Hegi. Illustr. Fl. Mittel-Eur. IV, 1, tab. 237, f. 5; Javorka ès Csapody, Icon. fl. Hung. f. 3291; Vestn. Tifl. bot. sada, 28; fig. 11; Syreistsch. Ill. fl. Mosk. gub. III, 146.—*Exs.*: GRF, No. 1179; Pl. Finl. exs. No. 914 and 1304; Fl. pol. exs. No. 61 b; Fl. Ital. exs. No. 1932; Fl. exs. austro-hung. No. 3701; Fl. lith. exs. No. 73.

Perennial. Rootstock slender, branched, creeping. Stem 10–45(50) cm tall, with 2 rows of scattered soft articulate hairs, alternating in various internodes, glabrous in other parts, partially ascending at base or trailing and rooting. Leaves orbicular-ovate to oblong-ovate, 1.5–3 cm long, 1–2 cm broad, subobtuse, incise-crenate or crenate, rarely almost pinnatisect into obtuse lobes, pubescent, rugose, rounded or subcordate at base; lower leaves short-petiolate, others sessile. Recemes opposite, lax, few-flowered, 2–20 cm long, in axils of 2–4 upper leaves. Bracts

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Plate XIX.

1. *Veronica melissifolia* Desf., upper part of plant, flower capsule.—2. *V. krylovii* Schischk., upper part of plant, corolla, capsule, seed.—3. *V. taurica* Willd., upper part of plant, corolla, capsule, seed.



lanceolate or oblong, shorter than or equaling calyx and pedicels. Pedicels of lower flowers longer than bracts and calyx, erect in fruit. Calyx 4-partite, somewhat pubescent, ciliate, with lanceolate lobes,  $1/2$  as long as corolla. Corolla 10–15 cm across, bright sky-blue, white-fringed, with dark veins, sometimes with white lower lobe and throat, or pink, with 3 broad, reniform or orbicular and 1 ovate-oblong lobes. Stamens included, with white filaments. Capsule 2.5–3 mm long, 3.5–4 mm broad, deltoid-obcordate, sparsely pubescent or pilose, ciliate,  $1/2$ – $2/3$  as long as calyx, compressed, with deltoid lobes, cuneate base, shallowly emarginate; style curved, longer than calyx. Seeds numerous, flat, about 1 mm long, slightly less than 1 mm broad, ovate, smooth. April to August.

In dry-valley forest meadows, in forest, forest-steppe and steppe zones, among shrubs, in gardens, fields. *European USSR*: Karelia-Lapland, Dvina-Pechora, Baltic Region, Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga Don, Trans-Volga Region, Upper Dniester, Bessarabia, Crimea, Lower Don, Lower Volga; *Caucasus*: Ciscaucasia, Dagestan, western, eastern and southern Transcaucasia; *Western Siberia*: Upper Tobol, Ob' Region, Irtysh, Altai mountains (rare); *East-432 ern Siberia*: Angara-Sayan (Minusinsk, Krasnoyarsk); *Soviet Far East*: Sakhalin (introduced); *Soviet Central Asia*: Tarbagatai forest (rare), Tien Shan (vicinity of Alma-Ata, introduced). *General distribution*: Scandinavia, Central and Atlantic Europe, Mediterranean Region, Balkan States-Asia Minor, Armenia-Kurdistan. Described from Western Europe. Type in London.

*Note.* A polymorphic plant. Glabrous and pilose forms (var. *pilosa* Benth.) occur.

71. *V. melissifolia* Desf. ex Poiret, Encycl. meth. VIII (1805) 526; Benth. in DC. Prodr. X, 472; Boiss. Fl. or. IV, 447; Schmalh. Fl. II, 275; Wulff in Tr. Tifl. bot. sada, XV, 104; Römpf in Fedde, Repert. Beih. L, 132; Grossh. Fl. Kavk III, 385; Stroh in Beih. Bot. Centralbl. LXI, 421; Riek in Fedde, Repert. LXXIX, 61.—*V. melissaefolia*  $\beta$ . *maxima* Benth, in DC. Prodr. X (1846) 472.—*V. maxima* Stev. in Mém Soc. Nat. Mosc. II (1809) 179, tab. 11, f. 8; M.B. Fl. taur.-cauc. III, 13; C. Koch, monogr. Veron. 19; Ldb. Fl. Ross. III, 242.—*V. maxima*  $\beta$ . *stricta* C. Koch in Linnaea, XXII–XXIII (1848) 692.—*V. urticaefolia* auct. non Jacq.; Pall. Ind. taur. (1796) 99; Georgi, Besch. Russ. Reich. III, 652.—*Fedia maxima* Roem. and Schult. Syst. veg. I (1817) 366.—*lc.*: Stev. l.c.; Buxb. Cent. I, tab. 34; Vestn. Tifl. Bot. sada, 28, fig. 17; Riek, l.c. tab. II, Abb. 5.—*Exs.*: GRF, No. 1079.

Perennial. Stem partially ascending, 50–90 cm tall, patently crispate-hairy. Leaves sparsely pilose or subglabrous, ovate, almost incise-dentate, with rounded or cordate base; lower leaves sessile, obtuse, upper subacute,

sometimes with very short petioles. Flowers in axillary, long lax, many-flowered, paniculate racemes. Pedicels erect, shorter than linear bracts and calyx. Calyx with 4 broadly lanceolate, equal 5–7 mm long lobes. Corolla about 5–8 mm across, pale sky-blue or whitish, almost equaling calyx; corolla limb rotate, with 3 almost identical, orbicular or orbicular-ovate and 1 oblong lobes. Stamens equaling corolla, with dark anthers. Capsule shorter than calyx, compressed, cordate, broader than long, with broad sinus, cuneate or somewhat rounded base; style equaling capsule, slender, curved. Seeds trigonous, biconvex, distinctly rugose. May to July (Plate XIX, fig. 1).

In shady forests, forest glades, among shrubby thickets, in mountains up to 2100 m, in gardens. *Caucasus*: Ciscaucasia, western, eastern and southern Transcaucasia, Talysh (rare). *General distribution*: Balkan States-Asia Minor, Armenia-Kurdistan. Described from cultivated specimen. Type in Paris.

72. *V. umbrosa* M.B. Fl. taur.-cauc. I (1808) 11, 414; III (1819) 12; C. Koch, Monogr. Veron. 15; Benth. in DC Prodr. X, 474; Wulff in Tr. Tifl. bot. sada, XV, 108; Grossh. Fl. Kavk. III, 387; Stroh in Beih. 433 Bot. Centralbl. LXI, 420.—*V. peduncularis* M.B. Besch. Casp. pl. (1800) 126, p.p.—Schmalh. Fl. II, 275, p.p.; Römpf in Fedde, Repert. Beih. L, 133, p.p.—*V. chamaedrys*  $\beta$ . *peduncularis* Ldb. Fl. Ross. III (1847–1849) 243, p.p.—*V. peduncularis* var. *umbrosa* (M.B.) Boiss. Fl. or. IV (1879) 440.—*lc.*: M.B. Cent. pl. I, tab. VII: Riek in Fedde, Repert. Beih. LXXIX, tab. X, 28.—*Exs.*: Fl. cauc. exs. No. 194; Pl. or. exs. No. 396.

Perennial. Plant 10–40 cm tall. Roots fibrous. Stem decumbent, rooting, fruiting stems ascending, glabrous or diffusely pubescent slender, slightly angular, sometimes reddish. Leaves sessile or short-petiolate, broad, ovate to oblong, obtuse or acute; middle leaves 10–30 mm long, 4–15 mm broad, serrate, entire at base, glabrous or sparsely pubescent; upper leaves lanceolate, serrate or entire. Racemes axillary, alternate, many-flowered, lax, long; inflorescence axis somewhat glandular-pubescent. Pedicels 2–3 times as long as calyx, filiform, horizontally diverging in fruit. Bracts ovate, entire. Calyx 4-partite, with oblong-lanceolate or oblong, almost equal acute lobes. Corolla 6–15 mm across, whitish, with dark veins, blue or pink, exceeding calyx. Capsule much shorter than calyx, enclosed, slightly emarginate, compressed, broader than long, with truncate base, glandular-pubescent. Seeds biconvex or plano-convex, large, 2–5 in locule. March to April.

In shady forests, on rocks in middle mountain zone. *European USSR*: Crimea, Lower Don; *Caucasus*: Ciscaucasia, western and eastern Transcaucasia. Endemic. Described from Crimea ('Karasu-bazar'). Type in Leningrad.

73. *V. nigricans* C. Koch in Linnaea, XVII (1843) 288, XXII (1848) 693; Ldb. Fl. Ross. III, 255; Fl. Gruz. VII, 573.—*V. peduncularis* auct. Cauc. non M.B.—*V. montana* auct. Cauc. non L.

Perennial. Plant blackening when dry. Stems numerous, procumbent, rarely partially ascending or erect. All leaves petiolate, ovate, often with two rows of hairs, dentate, appressed hairy. Racemes lax, axillary, exceeding stem tips. Pedicels 3 times as long as bracts, somewhat curved in fruit, 2–3 times as long as calyx. Calyx with 4 oblong, acute lobes. Capsule rather hard, equaling calyx, glabrous, orbicular, slightly compressed on sides near base, with acute-angled sinus. Seeds flat. April to June.

*Caucasus*: western Transcaucasia (Mingrelia). Endemic. Described from Caucasus. Type in Berlin.

Series 2. *Pentasepalae* (Benth.) Römpf in Fedde, Repert. Beih. L (1928) 97, grupe.—Subsect. *Pentasepalae* Benth. in DC. Prodr. X 434 (1846) 469.—§ *Austriacae* Wulf in Tr. Tifl. bot. sada, XV (1915) 116, p.p.—Stems not caespitose. Leaves entire, ovate to linear-lanceolate and linear, sessile or short-petiolate. Racemes opposite, dense. Calyx 5-partite, rarely 4-partite, with unequal teeth, 5th tooth much smaller than others. Capsule broadly obovate to orbicular, shorter than or equaling calyx, rounded at base, slightly emarginate. Seeds flat peltate.

74. *V. teucrium* L. Sp. pl. I (1762) 16; Willd. Sp. pl. I, 66; Benth. in DC. Prodr. X, 469; Boiss. Fl. or. IV, 448. p.p.; Pflanzenfam. IV, 3, 86; Wulff in Tr. Tifl. bot. Sada, XV, 116; Römpf in Fedde, Repert. Beih. L, 101; Kryl. Fl. Zap. Sib. X, 2456; Keller in Bot. Közler XXXVII, 3–4, 128; Stroh in Beih. Bot. Centralbl. LXI, 408.—*V. latifolia*  $\beta$ . *major*,  $\gamma$ . *minor*  $\delta$ . *caule stricto* C. Koch, Monogr. Veron. (183) 21.—*V. latifolia* L. Sp. pl. (1753) 13; Benth. l.c.; M.B. Fl. taur.-cauc. I, 10, 413; Ldb. Fl. Ross, III, 239; Boiss. Fl. or. IV, 449.—*V. latifolia*  $\beta$ . *minor* Ldb. l.c. 240, p.p.; C. Koch in Linnaea, XVII, 287.—*V. teucrium* a. *latifolia* Schmalh. Fl. II (1897) 277.—*V. teucrium*  $\alpha$ . *typica* Lindem. Fl. Cherson. 2 (1882) 52.—*V. pseudochamaedrys* Jacquin, Fl. Austr. I (1773) 36; Grossh. Fl. Kavk. III, 388.—*V. teucrium* ssp. *pseudochamaedrys* (Jacq.) Nym. Consp. Fl. Europ. (1878–1882) 545, p.p.; Stroh l.c.—*V. anisophylla* C. Koch, l.c.—*V. teucrium* var. *anisophylla* Trautv. in Tr. Peterb. bot. sada, 4 (1873) 574.—*V. teucrium* var. *integerrima* Trautv. l.c. (1876) 173; Stroh, l.c.—*l.c.*: Jacquin, l.c., tab. 60; Syreistsch. Ill. fl. Mosk. gub. III, 148; Vestn. Tifl. bot. sada, 28, fig. 14; Hegi, Illustr. Fl. Mittel-Eur. VI, 1, tab. 238, [f.] Javorka ès Csapody, Iconogr. fl. Hung. f. 3298.—*Exs.*: GRF, No. 93; Eston. pl. No. 173; Fl. pol. exs. No. 223, a, b;—Fl. exs. austro-hung. No. 92; Fl. Hung. exs. No. 456.

Perennial. Rootstock creeping, fusiform. Plant somewhat crispate-hairy. Stems single or 2–3, erect or ascending, 15(30)–70(100) cm



tall, rather thick. Leaves entire, ovate or oblong-ovate, 3–5.5 cm long, 1.5–2.5 cm broad, cordate-deltoid, subamplexicaul, sessile or short-petiolate, serrate-dentate to incise-crenate, very rarely subentire, glabrous above, hairy beneath, Racemes opposite, 2–7 in axils of upper leaves, dense, 6–15 cm long. Pedicels slender, erect, crispate-hairy, equaling or slightly longer than linear-lanceolate or linear bracts and calyx. Calyx unequally 5-partite, rarely 4-partite, 5th tooth about 1.5 mm long; calyx lobes linear-lanceolate to subulate, 3–4 mm long, glabrous or somewhat pilose. Corolla 9–17 mm across, bright blue, pink or white, with  
 435 dark veins, white in throat and pilose; corolla lobes unequal, ovate, or 3 orbicular-ovate and 1 ovate, acute. Stamens almost equaling corolla; anthers ovoid, blue, filaments blue. Capsule broadly obovate or obcordate to orbicular 3–3.5(5.5) mm long, glabrous or sparsely hairy, with rounded base, with shallow, narrow sinus. Style long, filiform, curved, 1.5 times as long as capsule. Seeds flat, peltate, about 1.5 mm broad. May to June.

In meadows, along forest edges, among scrub and in open forests. *European USSR*: Karelia-Lapland, Dvina-Pechora, Ladoga-Ilmen, Baltic Region, Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Trans-Volga Region, Upper Dniester, Black Sea Region, Crimea, Lower Don, Lower Volga; *Caucasus*: Ciscaucasia, eastern Transcaucasia; *Western Siberia*: Ob' Region. Upper Tobol, Irtysh. *General distribution*: Central and Atlantic Europe, Mediterranean Region, Armenia-Kurdistan. Described from Western Europe. Type in London.

75. *V. dentata* Schmidt, Fl. Bohem. I (1793) 20; M.B. Fl. taur.-cauc. III, 11; C. Koch, Monogr. Veron. 121.—*V. austriaca* L. Syst. Nat. ed. 10 (1759) 849, p.p.; Sp. pl. ed. 2, 17, ex parte.—*V. austriaca*  $\alpha$ . *dentata* Koch, Syn. fl. Germ. (1837) 526; Ldb. fl. Ross. III, 238, p.p.—*V. teucrium*  $\beta$ . *angustifolia* Vahl, Enum. pl. I (1805) 76.—*V. austriaca* ssp. *dentata* (Schmidt) Watzl in Abh. zool.-bot. Gesellsch. Wien, V, 5 (1910) 53; Wulff in Tr. Tifl. bot. sada, XV, 122; Stroh in Beih. Bot. Centralbl. LXI, 411.—*V. teucrium* b. *dentata* Čelak. Prodr. Fl. Bohem. (1867) 327; Schmalh. Fl. II, 277.—*V. teucrium* b. *austriaca* Čelak. l.c. 329.—*V. prostrata* c. *angustifolia* Benth. in DC. Prodr. X (1846) 470.—*V. montana* Pall. ex Ldb. Fl. Ross. III (1847–1849) 238, non L.—*V. austriaca*  $\times$  *V. latifolia* Kusnez. in Bull. Acad Pétersb. sér. 5, VI (1897) 190.—*Veronicastrum dentatum* Opiz, Seznam (1852) 102.—*Ic.*: Rchb. Ic. fl. Germ. XX, tab. 89, 1710, f.l. II; Hegi, Illustr. Fl. Mittel-Eur. VI, 1, fig. 33a; Javorka es Csapody, Iconogr. fl. Hung. No. 3297.—*Exs.*: Fl. exs. austro-hung. No. 924; Fl. Hung. exs. No. 454; Fl. exs. Reipubl. Boh.-Slov. No. 1168.

Perennial. Rootstock long. Plant 30–80 cm tall. Stems erect, single or few, somewhat densely pilose. Cauline leaves entire, oblong or oblong-lanceolate to lanceolate-linear, up to 7.5 cm long, 2.5 cm broad, serrate



or serrate-dentate, with regularly spaced teeth, rarely entire, sometimes with reflexed margin, sessile or short-petiolate, generally acute rarely sub-obtuse, pilose; leaves of terminal shoots numerous, much different from cauline leaves, narrow, linear, entire or with few teeth, rarely serrulate. Racemes lateral, axillary, elongated, many-flowered. Bracts linear. Calyx 436 5- or 4-partite, with unequal lobes; one lobe much smaller than others, all glabrous or pubescent, lanceolate, subobtusate. Corolla 10–13 mm across, bright blue or violet, hairy in throat, with unequal lobes, 3 subobtusate, ovate and 1 oblong, obtuse. Stamens slightly included. Capsule obovate-cordate, somewhat emarginate, glabrous or pubescent. Style filiform, 2 times as long as calyx and 1.5 times as long as capsule. June to August.

In open forests, forest-steppes, less often in steppes, in mountains up to 1700 m. *European USSR*: Upper Dnieper, Middle Dnieper, Volga-Don, Bessarabia, Upper Dniester, Crimea (?), Lower Don; *Caucasus*: southern Transcaucasia. *General Distribution*: Scandinavia, Central and Atlantic Europe, Balkan States-Asia Minor, Armenia-Kurdistan. Described from Western Europe. Type in Berlin?

76. *V. krylovii* Schischk. in Fl. Zap. Sib. X (1939) 2457.—*V. teucrium* ssp. *altaica* Watzl. in Abh. zool.-bot. Gesellsch. Wien, V, 5 (1910) 49, non *V. altaica* Fisch.; stroh in Beih. Bot. Centralbl. LXI, 410.—*V. teucrium* Bge. in Ldb. Fl. alt. I (1829) 40, non L.; Kryl. Fl. Alt. 946; Turcz. Fl. baic.-dah. 2, 244,—*V. teucrium* var. *minor* Trautv. in Bull. Soc. Nat. Mosc. XXXIX, 2 (1866) 439; Kryl. Fl. Zap. Sib. X, 2458.—*V. latifolia*  $\beta$ . *minor* Ldb. Fl. Ross. III (1847–1849) 240, partim.

Perennial. Stems (10)25–45(50) cm tall, several, sometimes single, erect or ascending at base, with leaves extending up to tips. Leaf surface covered with short twisted hairs; leaves opposite, puberulent, more densely pubescent beneath, sessile, oblong-ovate to lanceolate and linear-lanceolate, 1.5–4 cm long, 0.3–3 cm broad, acute, with rounded or broadly cuneate base, serrate- or incise-dentate. Flowers in 2–4 opposite racemes, in upper leaf axils. Pedicels of lower flowers longer than lanceolate, puberulent bracts and calyx; other pedicels almost equaling them. Calyx 5-partite, with lanceolate-linear lobes, with 1 lobe smaller than others. Corolla light blue, sometimes pink, 6–7 mm long and 10–13 mm across, 2 times as long as calyx; corolla lobes ovate or broadly ovate, obtuse. Capsule 4–5 mm long, almost equaling calyx, obcordate-ovate, nearly as long as broad, with shallow, narrow sinus and rounded base; style long, almost equaling sinus. Seeds flat, yellowish orbicular, 1–1.5 mm in diameter. May to July (Plate XIX, fig. 2).

In denuded forests, along forest edges, in dry-valley and inundated meadows; along stony mountain slopes, up to lower alpine zone.—*Western Siberia*: Ob' Region, Irtysh, Altai mountains; *Eastern Siberia*: Angara-Sayan (Irkutsk): *Soviet Central Asia*: Aral-Caspian Region, Syr Darya

(Martuk Station), Dzh.-Tarbagatai, Endemic. Described from Altai mountains. Type in Leningrad.

- 437 77. *V. prostrata* L. Sp. pl. (1762) 17; M.B. Fl. taur.-cauc. 1, 10, 413, p.p.: C. Koch, Monogr. Veron. 21; Pflanzenfam. IV, 3b, (1895) 86; Schmalh. Fl. II, 276; Wulff in Tr. Tifl. bot. sada, XV, 119; Grossh. Fl. Kavk. III, 388; Kryl. Fl. Zap. Sib. X, 2458; Römpf in Fedde, Repert. Beih. L, 103; Stroh in Beih. Bot. Centralbl. LXI, 407.—*V. austriaca* Bge. Beiträge z. Kenntn. d. Fl. Russl. (1851) 426; Steven, Verzeichn. 269, p.p.—*V. austriaca*  $\alpha$ . *dentata* Ldb. Fl. Ross. III (1847–1849) 238, p.p.—*V. austriaca*  $\alpha$ . *prostrata* Kauffm. Mosk. Fl. (1866) 350.—*V. dentata* Zinger, Sb. sved. (1885) 327, non Schmidt.—*Veronicastrum prostratum* Opiz, Seznam (1852) 102, p.p.—*lc.*: Fedtsch. and Fler. Fl. Evrop. Ross. 817; Wulff in Vestn. Tifl. bot. sada, 28, fig. 12; Hegi, Illustr. Fl. Mittel-Eur. VI, 1, f. 32; Javorka és Csapody, Iconogr. fl. Hung. f. 3295.—*Exs.*: GRF, No. 983; Fl. Hung. exs. No. 455; Fl. exs. austro-hung. No. 926; Fl. Podol. exs. No. 979.

Perennial. Plant grayish, uniformly puberulent. Stems 5–30 cm tall, numerous, vegetative stems decumbent, flowering stems ascending. Leaves short-petiolate, lower leaves narrowly ovate, upper oblong-lanceolate or linear-lanceolate, narrowed into very short petiole, obtuse, crenate, 1–2 cm long, 3–8 mm broad. Racemes lateral, opposite, in 2–4 upper leaf axils, 1.5–4 cm long, dense, many-flowered. Pedicels shorter than linear-lanceolate bracts and calyx. Calyx 5-partite, with unequal, linear-lanceolate lobes, exceeding capsule; two anterior lobes 2 times as long as posterior, 5th lobe 1/3 as long as anterior. Corolla 5–8 mm across, bluish lilac or pale sky-blue, lobes 4–5 mm long; one lobe orbicular-ovate, 2 subacute, identical, broadly ovate, and 1 ovate, obtuse. Stamens much shorter than corolla. Capsule 3–5 mm long, broadly obovate or obcordate, longer than broad, with rounded base, glabrous or minutely puberulent, with shallow and acute sinus; style long, equaling capsule. Seeds orbicular peltate, 1 mm long, about 1 mm broad, yellowish. April to July.

On dry steppe slopes, in dry-valley meadows and forest glades, among scrub in north in dry pine forests, on mountain slopes up to 1500 m. *European USSR*: Karelia-Lapland, Baltic Region, Ladoga-Ilmen, Upper Volga, Upper Dnieper, Volga-Don, Trans-Volga Region, Upper Dniester, Bessarabia, Black Sea Region, Crimea, Lower Don, Lower Volga; *Caucasus*: Ciscaucasia, *Western Siberia*: Upper Tobol, Irtysh. *General distribution*: Central and Atlantic Europe, Mediterranean Region. Described from Western Europe. Type in London.

*Series 3. Austriacae* Wulff in Tr. Tifl. bot. sada, XV(1915) 116, p.p.; Riek in Fedde, Repert. LXXIX 9, p.p.—*Grex Caucasicae* Riek,

- 438 l.c. 10, p.p.—*Pentasepala* Römpf in Fedde, Repert. L (1928) 97, p.p.—Stem erect or ascending. Leaves subsessile or sessile, pinnatifid or pinnatisect, with linear-cuneate or filiform lobes. Racemes opposite, axillary, sparsely flowered. Pedicels several times as long as calyx, diverging in fruit. Calyx 4-partite, rarely 5-partite. Capsule shorter than or equaling calyx, extremely compressed. Seeds flat, suborbicular.

78. *V. austriaca* L. Syst. nat. ed. 10, II (1759) 849; M.B. Fl. taur-cauc. I, 13; III, 13, p.p.; Ldb. Fl. Ross. III, 238, p.p.; C. Koch, Monogr. Veron. 22; Benth. in DC. Prodr. X, 470, p.p.; Boiss. Fl. or. IV. 44; Pflanzenfam. IV. 3b, 86; Wulff in Tr. Tifl. bot. sada, XV, 121, p.p.; Römpf in Fedde, Repert. Beih. L, 101; Grossh. Fl. Kavk. III, 388; Keller in Bot. Közl. XXXVII, 3-4, 140, p.p.; Stroh in Beih. Bot. Centralbl. LXI, 410, p.p.—*V. austriaca* ssp. *jacquini* (Baumg.) Maly J.C. Enum. Pl. (1846) 201; Wulff l.c. 123; Stroh. l.c. 412.—*V. multifida* Jacq. ex Schmalh. Fl. II (1897) 277, in synonym.—*V. recta* Benth. in DC. l.c. 474; Ldb. l.c. 242.—*V. austriaca* β. *pinnatifida* Koch, Syn. fl. Germ. (1837) 526; Ldb. l.c. 239.—*V. teucrium* γ. *austriaca* Arcangel. Comp. d. fl. Ital. (1882) 514; Schmalh. l.c. 277, p.p.—*l.c.*: Rchb. l.c. fl. Germ. XX, tab. 89, 1710, f. III; Hegi, illust. Fl. Mittel-Eur. V, 1, f. 33 b., c.; Syreistsch. Fl. Mosk. gub. III, 149; Fl. Yugo-Vost. V, fig. 633; Vestn. Tifl. bot. sada, 28, fig. 10; Javorka ès Csapody, Iconogr. fl. Hung. f. 3296.—*Exs.*; Fl. Ital. exs. No. 1931; Hayek, Fl. Stir. Exs. No. 669.

Perennial. Plant scattered hairy. Stems (10)30-70 cm tall, single or few, erect, rarely partially ascending. Leaves sessile, ovate or lanceolate, simply pinnatifid (var. *pinnatifida* Koch.) or bipinnatifid (var. *bipinnatifida* Koch.) to pinnatisect, with linear or linear-lanceolate lobes; lobes, narrowed at base, entire or incised. Flowers in 2-4 axillary, elongated, solitary or opposite racemes, in axils of upper leaves on erect pedicels, generally exceeding calyx; upper racemes elongating later. Calyx with 4, rarely 5 unequal lobes, 5th tooth small and linear. Corolla 7-10 mm across, bright blue, with elongated, acute lobes. Stamens slightly shorter than corolla. Capsule 4-5 mm broad, equaling calyx or shorter, obcordate or obovate, with rounded base, emarginate, puberulent or glabrous. Seeds peltate, about 1.5 mm broad. Flowering May to July. Fruiting July to August.

- In steppes; forest-steppe, mountain meadows, scrub. *European USSR*: Ladoga-Ilmen (rare), Upper Volga, Middle Dnieper, Upper Dnieper, Volga-Don, Bessarabia, Crimea, Upper Dniester, Lower Don; *Caucasus*: eastern Transcaucasia. *General distribution*: Central Europe, Balkan States-Asia Minor, Armenia-Kurdistan, Iran. Described from Western Europe. Type in London.



79. *V. arceutobia* Woron. in Tr. Bot. inst. Acad. Nauk SSSR, (1933) 223; Stroh in Beih. Bot. Centralbl. LXI, 414.—*V. austriaca* Jacq. subsp. *jacquinii* Baumg. var. *bipinnatifida* C. Koch, sec. Wulff in Tr. Tifl. bot. sada, XV, (1915) 125.

Perennial. Plant gray-pubescent throughout with appressed crispate hairs. Stem partially ascending, with projecting, numerous, flowering branches. Leaves ovate, bipinnatifid, with narrowly linear or subfiliform lobes, partly decurrent. Flowers in long, many-flowered inflorescences; pedicels erect or diverging. Bracts simple or tri-multipartite into numerous segments, equaling or  $1/3-1/2$  as long as pedicels. Calyx lobes linear, unequal, outer lobes 2 times as long as inner lobes. Corolla deep blue or sky-blue, 5–7 mm across. Capsule broadly obcordate, with cuneate base, very shallow sinus and firm valves. Style almost 2 times as long as capsule. May to July.

Among juniper thickets. *Caucasus*: eastern Transcaucasia (Bozdag Mountain). Endemic. Described from Azerbaidzhan. Type in Berlin.

80. *V. caucasica* M.B. Fl. taur.-cauc. I (1808) 13; II 453; C. Koch, Monogr. Veron. 23; Benth. in DC. Prodr. X, 474; Ldb. Fl. Ross. III, 242; Boiss. Fl. or. IV, 440; Schmalh. Fl. II, 275; Wulff in Tr. Tifl. bot. sada, XV, 109; Römpp in Fedde, Repert. Beih. L, 134; Grossh. Fl. Kavk. III, 387; Riek in Fedde, Repert. Beih. LXXIX, 53; Stroh in Beih. Bot. Centralbl. LXI, 420.—*V. ossetica* Stev. in Mem. Soc. Mat. Mosc. II (1809) 180.—*V. canescens* C. Koch in Linnaea, XVII, (1843) 280; C.A.M. Verzeichn. 106—Ic.: Riek, l.c. tab. II, f. 7.

Perennial. Plant 12–20(30) cm tall, pubescent, sometimes also with glandular hairs. Stem erect or ascending. Leaves sessile, ovate or oblong, pinnatisect, with oblong or linear-cuneate lobes, often narrowed at base, obtuse, rarely acute; lower leaves pinnately lobed. Racemes opposite, lateral in upper leaf axils, sparsely flowered. Lower bracts pinnatisect, upper oblong, entire. Pedicels filiform, 3 times as long as calyx, diverging in fruit, curved. Calyx lobes broadly lanceolate or oblong, exceeding capsule pubescent. Corolla exceeding calyx, white with lilac stripes, about 12 mm across. Stamens included. Capsule pubescent, extremely compressed, 4–5 mm long, 6–7 mm broad, with truncate base, broad and short sinus; style long, filiform, curved. Seeds ovate or orbicular 1–1.5 mm long, 1 mm broad, smooth, flat. May to July (Plate XX, fig. 1).

440 On stony slopes, in rock crevices, among debris at 600–2500 m. *Caucasus*: Ciscaucasia, Dagestan, western and southern Transcaucasia. Endemic. Described from Georgia. Type in Leningrad.

Series 4. *Orientales* Wulff in Tr. Tifl. bot. sada, XV (1915) 127; Römpp in Fedde, Repert. L 104; Riek in Fedde, Repert. LXXIX, 10.—Stem partially ascending or trailing, sometimes woody at base.



Leaves oblong-ovate to linear, entire or pinnately incised into narrow, entire or dentate lobes, sessile or subsessile. Inflorescence many-flowered, generally on short peduncles. Calyx 4–5-partite, with extremely reduced 5th tooth. Capsule flat, broader than long, cuneate or rounded at base, broadly emarginate. Seeds plano-convex.

81. *V. orientalis* Mill. Gard. Dict. VIII (1768) No. 10; M.B. Fl. taur.-cauc. I, 12; III, 13, p.p.; C. Koch, Monogr. Veron. 22; Benth, in DC. Prodr. X, 469; Ldb. Fl. Ross. III, 238, p.p.; Boiss. Fl. or. IV, 443; Pflanzenfam. IV, 3b, 86; Schmalh. Fl. II, 277, p.p.; Wulff in Tr. Tifl. bot. sada, XV, 132; Römpf in Fedde Repert. Beih. L, 109; Keller in Bot. Közl. XXXVII, 3–4, 146; Stroh in Beih. Bot. Centralbl. LXI, 417, p.p.; Grossh. Fl. Kavk. III, 389; Riek in Fedde Repert. Beih. LXXIX, 31.—*V. billardieri* Vahl. Enum. pl. I (1805) 70; Riek, l.c. 37; Stroh, l.c. 418.—*V. parviflora* Vahl, l.c. 72; C. Koch, l.c.; Benth. l.c. 471.—*V. pectinata* Georgi, Beschr. Russ. Reich. III, 4 (1800) 652, non L.—*V. teucrium* var. *integerrima* Trautv. in Tr. Peterb. bot. sada, IV (1876) 173; VII, 493.—*V. austriaca*  $\beta$ . *orientalis* C. Koch in Linnaea, XVII (1843) 287.—*Exs.*: Callier, Iter. taur. No. 781.

Perennial. Rootstock woody, long. Plant 10–30 cm tall, crispate-puberulent, rarely subglabrous. Leaves sessile, short, entire; lower leaves oblong or lanceolate, with cuneate base, incise dentate, rarely entire, upper leaves often narrower, lanceolate, uppermost entire. Racemes 2–4, short, somewhat lax, unilateral in fruit, in upper leaf axils. Pedicels slightly exceeding calyx, diverging. Calyx with 4–5 unequal, linear-lanceolate, subobtusate lobes. Corolla flesh-colored, reddish, or pale sky-blue, exceeding calyx. Capsule glandular-pubescent, broader than long, obcordate, subobtusate, with truncate tip and rounded or cuneate base, equaling or slightly exceeding calyx. Seeds ovate. May to July.

443 On rocks and stony slopes.—*Caucasus*: Ciscaucasia, eastern and southern Transcaucasia, Talysh. *General distribution*: Asia Minor, Armenia-Kurdistan, Iran. Described from cultivated specimens. Type in London.

82. *V. taurica* Willd. Sp. pl. I (1797) 70; Stev. in Loddig. Bot. Cab. X, tab. 911; C. Koch, Monogr. Veron. 22; Stroh in Beih. Bot. Centralbl. LXI, 417; Riek in Fedde, Repert. Beih. LXXIX, 36.—*V. orientalis*  $\beta$ . *taurica* Vahl. Enum. pl. I (1805) 72.—*V. orientalis*  $\beta$ . *humilis angustifolia* M. B. Fl. taur.-cauc. I (1808) 12.—*V. orientalis* auct. non Mill. (1768), nec Ait. (1789); Ldb. Fl. Ross. III, 238, p.p.; Boiss. Fl. or. IV, 443, p.p. (pl. taur.); Römpf in Fedde, Repert. Beih. L, 109.—*V. orientalis* var. *tenuifolia* Boiss., Diagn. pl. or. II, 3 (1859) 167; Fl. or. IV, 443; Wulff in Tr. Tifl. bot. sada, XV, 134.—*V. bordzilovskii* Juz. in Spisok rast. Gerb. fl.

SSSR, XI (1949) 149.—*lc.*: Stev. in Loddig. l.c. tab. 911; Riek, l.c. f. 20, tab. VII.—*Exs.*: GRF, No. 3473; Callier, Iter. taur. No. 166.

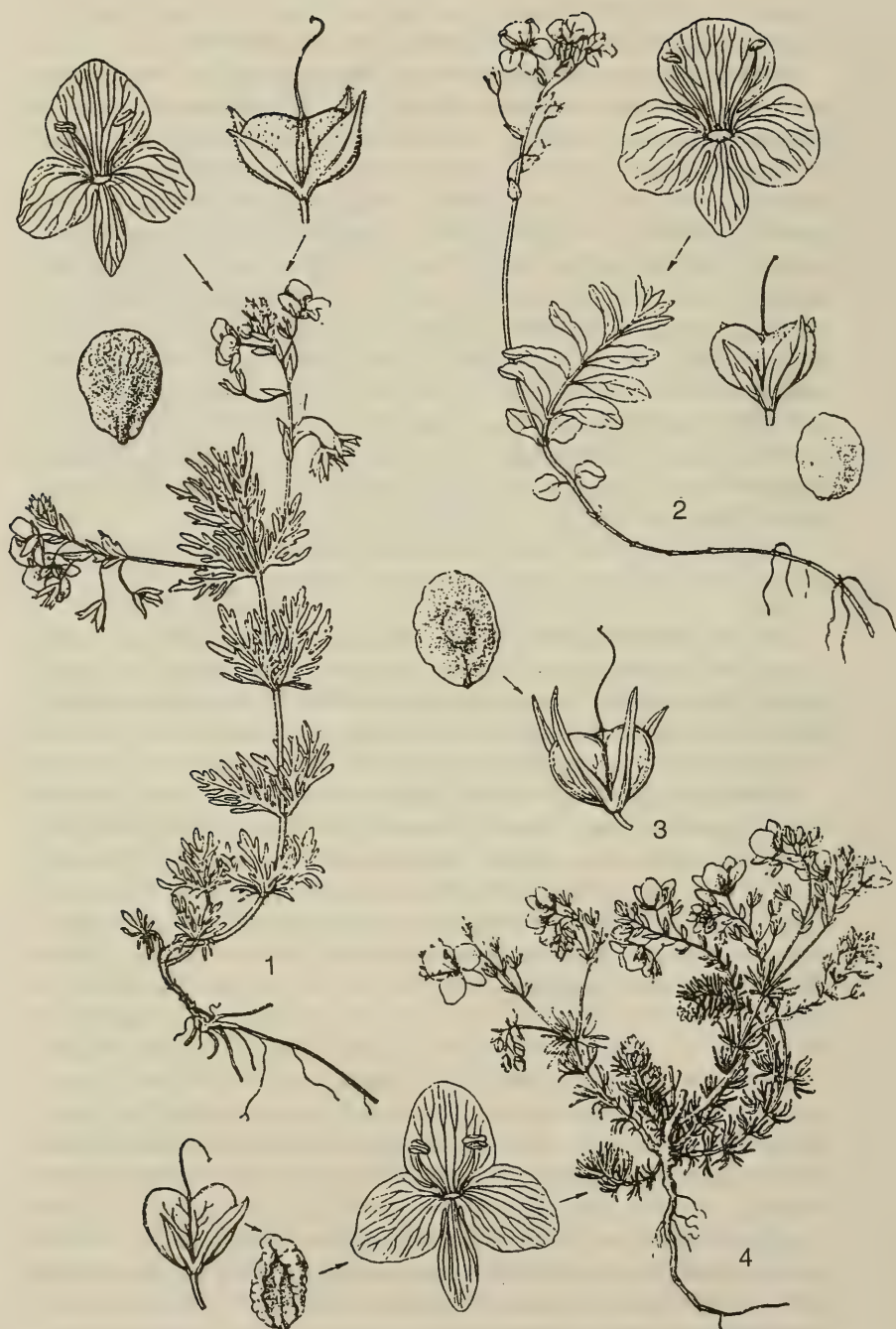
Perennial. Roots numerous, woody. Stem (8)10–30 cm tall, arcuate-ascending or trailing, pale green or, mainly in lower part, reddish, densely crispate-puberulent, sometimes subglabrous below. Leaves mainly linear or linear-lanceolate, lower sometimes oblong, narrowly cuneate at base, entire or with 1–4(6) spaced, short or long, somewhat diverging teeth, densely puberulent on both surfaces or subglabrous, with isolated hairs beneath along margin and veins. Flowers in 2–3 axillary, many-flowered racemes, somewhat elongated or reduced. Pedicels at flowering stage equaling or shorter than bracts, later 2 times as long. Calyx with 4–5 unequal lobes, generally glabrous or with ciliate margin, rarely pilose, sometimes with glandular hairs. Corolla 4–17 mm across, light sky-blue to dark blue sometimes becoming pink on drying. Capsule 4.5–5 mm long, 3–4.5 mm broad, equaling calyx or slightly longer or shorter, with nearly rounded, slightly narrowed base, glabrous or glandular-pubescent. Seeds ovate. Flowering May to July (Plate XIX, fig. 3).

On stony mountain slopes, in calcareous habitats. *European USSR*: Crimea. Endemic. Described from Crimea. Type in Leningrad.

83. *V. kurdica* Benth. in DC. Prodr. X (1846) 473; Boiss. Fl. or. IV. 443; Wulff in Tr. Tifl. bot. sada, XV, 135; Römpf in Fedde, Repert. Beih. L, 116; Grossh. Fl. Kavk. III, 389; Riek in Fedde, Repert. Beih. LXXIX, 38; Stroh in Beih. Bot. Centralbl. LXI, 418.—*V. sypspirensis* C. Koch in Linnaea, XXIII (1848) 698.—*lc.*: Riek, l.c. tab. 7.

444 Perennial. Caespitose plant, 5–10 cm tall (up to 20–25) cm tall—*f. segetalis* Grossh.), with numerous flexuous stems, finely crispate-velutinous, with short, slender, firm branches. Leaves 5–7(20) mm long, 2–3(5) mm broad, often oblong-ovate, upper leaves sometimes linear-lanceolate, often with reflexed margin; upper leaves entire, lower with few teeth, often subbtuse, sometimes acute. Racemes many-flowered, on short peduncles, elongated in fruit, up to 5–8 cm long. Pedicels 5–8 mm long, 2–3 times as long as small elliptical bracts and calyx, diverging in fruit, slender. Calyx lobes 4, linear-lanceolate or lanceolate, unequal, shorter than capsule. Corolla 7–8 mm across, generally dark blue, rarely larger (10 mm) and lighter-sky-blue (*f. segetalis* Grossh.). Capsule about 5 mm broad, about 4 mm long, obcordate, with cuneate base, glabrous or puberulent. Seeds ovate. Flowering May to July.

In subalpine and alpine zones on rocky and pebbly slopes. *Caucasus*: southern Transcaucasia (Karadag, Nakhichevan). *General distribution*: Balkan States-Asia Minor, Armenia-Kurdistan, Iran. Described from Transcaucasia. Type in London.





84. *V. denudata* Alboff in Tr. Tifl. bot. sada, I (1895) 190; Wulff in Tr. Tifl. bot. sada, XV, 86; Grossh. Fl. Kavk. III, 392; Stroh in Beih. bot. Centralbl. LXI, 419.—*V. petraea* Römpf in Fedde, Repert. Beih L (1928) 133, non Stev.

Perennial. Profusely branched plant, crispate-puberulent, glandular in inflorescence. Stem trailing or partially ascending; flowering shoots densely leafy. Leaves oblong-lanceolate or lanceolate, 10–14 mm long, 2–4 mm broad, with very short petioles or sessile, with few teeth along margin or entire with reflexed margin, with 1 prominent vein, crispate-puberulent along veins. Inflorescences terminal and axillary in upper leaf axils, short, rather dense. Bracts oblong-ovate, glandular-ciliate,  $1/2$ – $2/3$  as long as slender pedicels, latter arcuate and diverging in fruit. Calyx lobes unequal, oblong-elliptical,  $2/5$ – $1/2$  as long as pedicels. Capsule obcordate or reniform, broader than long, with rounded base. May to June.

In alpine zone. *Caucasus*: western Transcaucasia. Endemic. Described from Georgia. Type in Geneva.

85. *V. multifida* L. Sp. pl. I (1753) 13; M.B. Fl. taur.-cauc. I, 13, p.p.; III, 13; C. Koch, Monogr. Veron. 22; Benth. in DC. Prodr. X, 471; Boiss, Fl. or. IV, 442; Pflanzenfam. IV, 3b, 86; Wulff in Tr. Tifl. bot. sada, XV, 127; Grossh. Fl. Kavk. III, 389; Römpf in Fedde, Repert. Beih. L, 110; Riek in Fedde, Repert. Beih. LXXIX, 28; Stroh in Beih. Bot. Centralbl. LXI, 417.—*V. tenuifolia* M.B. l.c. p.p. non Asso (1779); C. Koch, l.c. 23.—*V. orientalis* var. *dissecta* Trautv. in 445 Bull. Soc. Nat. Mosc. XXXIX (1866) 438.—*V. austriaca*  $\gamma$ . *bipinnatifida* Ldb. Fl. Ross. III (1847–1849) 239, p.p.—*V. austriaca*  $\gamma$ . *tenuifolia* C. Koch in Linnaea, XVII (1843) 287.—*V. austriaca*  $\delta$ . *multifida* Pall. Ind. Taur. (1796) 92.—*V. teucrium* c. *austriaca* Schmalh. Fl. II (1897) 277, p.p.—*V. teucrium* var. *multifida* Wallr. Sched. crit. I (1822) 15; Trautv. in Tr. Peterb. bot. sada, IV, 398, p.p.; VII, 493; X, 124.—*V. multifida* var. *tenuifolia* Boiss. l.c.—*V. biebersteinii* C. Richter in Denkschr. Akad. Wien, 1 (1885) 24.—*l.c.*: Rchb. Ic. fl. germ. XX, tab. 88, 1709, f. IV; Juel in Acta Horti Berg. I. No. 5, tab. 2, f. 1; Wulff in Vestn. Tifl. bot. sada, 28, fig. 8.—*Exs.*: GRF, No. 1126; Callier, Iter. taur. No. 161; Fl. pol. exs. No. 759.

Perennial. plant grayish, crispate-puberulent. Stems woody at base, 10–25 mm (sic) long, numerous, ascending or trailing, strong, with leaves

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Plate XX.

1. *Veronica caucasica* M.B., general appearance of plant, corolla, capsule, seed.—2. *V. glabri-folia* Boriss., general appearance of plant, corolla, capsule, seed.—3. *V. filifolia* Lipsky, capsule, seed.—4. *V. armena* Boiss., general appearance of plant, corolla, seed, capsule.



extending up to the tips. Leaves sessile or with very short petioles, with cuneate base, 1- or 2- pinnatisect into very narrow, linear, entire or parted lobes. Racemes lateral, axillary, opposite, 2-4(5) in upper leaf axils, puberulent, reduced, dense. Pedicels scarcely exceeding calyx, erect in fruit. Calyx 5-partite, with unequal, narrowly lanceolate lobes, 5th lobe the smallest. Corolla exceeding calyx, 5-6 mm long, with 5 veins at base, pale pink, violet, red, pale sky-blue or bluish, with short tube; corolla limb with 4 unequal subacute lobes, one of them deltoid-orbicular, 2 ovate and 1 oblong. Stamens curved, included. Capsule equaling, slightly longer or shorter than calyx, truncate or obscurely emarginate, deltoid-obcordate, broader than long, cuneate at base, glabrous or finely glandular. May to July.

On grassy slopes, in sandy places in steppe region. *European USSR*: Trans-Volga Region (?), Black Sea Region (?), Crimea, Lower Don (Donets forest-steppe), Lower Volga (Krasnoarmeisk, Stalingrad, Bogdo); *Caucasus*: Ciscaucasia, Dagestan, western, eastern and southern Transcaucasia, Talysh; *Western Siberia*: Irtysh (Kochetavsk Mountains, Tersakkan); *Soviet Central Asia*: Aral-Caspian Region, Dzh.-Tarbagatai. *General distribution*: Balkan States-Asia Minor, Armenia-Kurdistan. Described from Transcaucasia. Type in London.

86. *V. filifolia* Lipsky in Zap. Kievskogo obshch. estestv. XI (1890) 54; Tr. Peterb. bot. sada, XIII, 323; Schmalh. Fl. II, 276; Wulff in Tr. Tifl. bot. sada, 113; Römpf in Fedde, Repert. Beih. L, 110, Grossh. Fl. Kavk. III, 386; Riek in Fedde, Repert. Beih. LXXIX, 53; Stroh in Beih. Bot. Centralbl. LX, 420.—*lc.*: Journ. Linn. Soc. Bot. XLIX, 456, 458 (fl.)—*Exs.*: GRF, No. 3694.

446 Perennial. Cushion plant. Stems numerous, (10)15-30 cm tall, often branched almost from base, erect or partially ascending, sparsely crispate-pubescent, densely leafy, stems as the result appearing crowded with leaves; sterile axillary shoots more densely leafy, compared with flowering shoots, reaching 10 cm in height. Leaves sessile, light green bipinnatipartite, with slender, almost filiform lobes. Racemes 4-8, opposite, sparse, sometimes developing also on lower branches. Bracts linear, equaling calyx. Pedicels 2-3 times as long as calyx, diverging in fruit. Calyx about 5 mm long, lobes 4, similar and sublinear, acute. Corolla white, with blue veins, over 10 mm long, readily shedding, exceeding calyx, with very short tube, with 3 orbicular or orbicular-reniform, subobtusate and 1 ovate, subacute lobes. Capsule shorter than calyx lobes which persist in the form of 4 slender teeth, extremely compressed, flat, glabrous, about 6 mm broad, 2-3 mm long, with rounded base and broad, obtuse sinus; sometimes upper capsules without sinus, with short, slender style; pedicels horizontally diverging in fruit. Seeds flat, slightly concave on one side,

orbicular, about 2 mm in diameter, inserted at base, with slightly rugose surface. Flowering from April to May. Fruiting in June (Plate XX, fig. 3).

On pebbly mountain slopes, among scrub at altitude of about 500 m. *Caucasus*: western Transcaucasia (Markotkh Range). Endemic. Described from vicinity of Novorossiisk. Type in Leningrad.

Series 5. *Turcomanicae* Boriss.—*Grex Orientales* Stroh in Bot. Centralbl. LXI (1942) 418, p.p. non Riek., nec Wulff.—Stems short, numerous, flexuous. Leaves small, 3(4–5)-partite or incised into oblong-rhombic or lanceolate lobes, petiolate. Racemes lax, few-flowered. Pedicels erect or curved. Calyx 4-partite, with connate lobes constricted at tip, exceeding capsule. Corolla red. Capsule compressed, broader than long, with cuneate base. Seeds planoconvex.

87. *V. czerniakowskiana* Monjuschko in Izv. Glavn. bot. sada, XXVII (1928) 95; Stroh in Beih. Bot. Centralbl. LXI, 418; Fedtsch. in Fl. Turkm. VI, 272.

Perennial. Rootstock woody, slender, profusely branched. Stems numerous, 8–25 cm tall; slender, flexuous, branched, crispate-puberulent, more densely so in upper part of plant and inflorescence axis. Leaves opposite with 1–4 mm long petioles, 5–10 mm long, often ternate, palmately lobed, rarely 4–5-partite or incised, orbicular-ovate, puberulent on both surfaces or subglabrous; lobes entire oblong-rhombic or obovate, 2–6 mm long, 3–4 mm broad, subacute, with middle lobe larger than others; lower  
447 leaves sometimes entire, orbicular-spatulate. Racemes lateral or terminal, lax, 1–1.5 cm long, few-flowered. Pedicels erect or curved, very densely hispid, 2–4 mm long, shorter at first, later equaling calyx. Bracts short-petiolate, exceeding or equaling pedicels, ovate-rhombic, entire. Calyx 4-partite, with about 3 mm long lobes, 1/4 united at base and constricted, hispid, oblong-ovate, slightly broadened at tip, subobtuse, slightly exceeding capsule. Corolla purple (when dry), 5–9 mm across, lobes hispid outside. Stamens shorter than or equaling corolla; anthers about 1 mm long, elliptical. Undeveloped capsule densely puberulent, orbicular or orbicular-ovate, without sinus, not exceeding united part of calyx, i.e. about 1 mm long; developed capsule (according to Manyushko) 3 mm long, 4 mm broad, compressed, broadly emarginate, densely puberulent, cordate, with cuneate base; style filiform, about 3 mm long. Seeds planoconvex, smooth. Flowering from April to June.

On stony mountain slopes, in juniper and steppe zone, at 1200–2400 m. *Soviet Central Asia*: mountainous Turkmenia (Kopet-Dag Range). Possibly grows in Iran. Described from Kopet-Dag. Type in Leningrad.

*Note.* Distinguished from species of series *Orientales* (p. 387) by the ternate leaves, petioles about 3 mm long, compressed capsule, and red flowers.

88. *V. tripartita* Boriss. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSR, XVII (1955).—*V. khorassanica* B. Fedtsch. in Fl. Turkm. VI (1954) 271. p.p. non Czernjak.

Perennial. Rootstock woody, simple, fusiform, slender. Plant profusely branched from base. Stems rather slender, numerous, partially ascending or bent, densely leafy, 5–9 cm tall, bluish gray due to densely hispid pubescence. Leaves opposite, with short winged petioles or upper leaves subsessile, 3-lobed, with linear or lanceolate obtuse lobes, 5–8 mm long, with reflexed margin, rather thick, bluish gray due to dense pubescence or subglabrous, with isolated, curved, hispid hairs; middle lobe of leaf longer. Racemes lateral, 1–3 cm long, dense, many-flowered, oblong, rarely capitate. Pedicels shorter than or equaling calyx, densely hispid. Bracts almost equaling or exceeding pedicels, sessile, entire, oblong, densely hispid on both surfaces, somewhat thick. Calyx 4-partite, shorter than or equaling capsule, 2–3 mm long, with lobes 1/4 united at base, oblong-lanceolate, obtuse, densely hispid on both surfaces, constricted at tip at flowering stage. Corolla purple (when dry), limb with 4 lobes, hispid outside. Stamens almost equaling corolla; anthers large, oblong-ovate. Style shorter than stamens, slightly exceeding calyx. Capsule cordate, about 3.5 mm long and 3 mm broad, densely hispid, with rounded lobes, diverging at right angle, rounded at base; style filiform, flat, curved, about 2 mm long. Seeds 1.5 mm long, 1 mm broad, plano-convex in upper part, rugose on convex side, with oblong broad hilum and radially rugose along margin on the other side. Flowering and fruiting in August.

On stony slopes in high-altitude zone. *Soviet Central Asia*: mountainous Turkmenia (Kopet-Dag Range, middle part). Described from Dalancha Mountain. Type in Leningrad.

*Note.* Distinguished from *V. czerniakovskiana* Monjuschko by the 5–9 cm long stems, dense, bluish gray, hispid pubescence, linear or lanceolate-linear lobes of leaves, winged petioles, dense, lateral, many-flowered racemes, oblong, sessile bracts, rather thick oblong-lanceolate calyx lobes, capsule rounded at base and larger seeds.

Series 6. *Khorossanicae* Boriss.—Plants short, woody at base, grayish-pubescent. Leaves linear, sessile, entire. Racemes lateral, dense, glandular-hispid. Calyx 4-partite, shorter than capsule, glandular-hispid. Corolla red. Capsule broader than long, orbicular, obscurely emarginate, glandular. Seeds oblong.

89. *V. khorossanica* Czernjak. in Fedde, Repert. XXVII (1930) 280, p.p.; Stroh in Beih. Bot. Centralbl. LXI, 433.—B. Fedtsch. in Fl. Turkm. VI, 271 p.p.

Perennial. Rootstock woody, profusely branched. Plant grayish throughout due to velutinous indumentum, glandular-pubescent in upper



part. Stems numerous, densely leafy, partially ascending, 6–8 cm tall, 6–12 cm including inflorescence. Leaves linear, sessile, 5–10(15) mm long, 1–1.5 mm broad, with reflexed margin. Racemes lateral, in upper leaf axils, firm, dense and many-flowered, 3–7 cm long, glandular-hispid in upper part, on 5–7 cm long peduncles. Bracts linear, 1–1.5 mm. long. Pedicels 2–3 mm long. Calyx 3 mm long, 4-partite, glandular-hispid, with linear lobes, not exceeding capsule. Corolla red, 6–7 mm across, with rounded, 3 mm long lobes. Capsule 2.5 mm long, 3 mm broad, compressed, with rounded and obscurely emarginate tip; style filiform, 3 mm long. Seeds oblong, 1.5 mm long. Flowering from April to June.

In pebbly and stony steppe regions of high foothills and middle mountain zone. *Soviet Central Asia*: mountainous Turkmenia (Kopet-Dag Range) *General distribution*: Iran (Khorasan Mountains). Described from northern Iran. Type in Leningrad.

*Note*. B.A. Fedtschenko (Flora Turkm. VI) indicates for *V. khorossanica* Czernjak. ternate leaves on the vegetative shoots. Plants with this characteristic are related to *V. tripartita* Boriss. sp. nov., collected in the Dalancha Mountain in the central part of the Kopet-Dag Range.

Series 7. *Officinales* Römpf in Fedde, Repert. L (1928) 117, gruppe.—*Strictiflorae* Wulff in Tr. Tifl. bot. sada, XV (1915) 101 p.p.—Stems rooting. Leaves entire. Racemes lateral, dense. Pedicels erect, shorter than or equaling calyx. Calyx 4-partite, with lanceolate or linear lobes. Capsule exceeding calyx, compressed, obdeltoid. Seeds suborbicular, plano-convex.

90. *V. officinalis* L. Sp. pl. (1753) 11; M.B. Fl. taur.-cauc. I, 10; C. Koch, Monogr. Veron. 24; Benth, in DC. Prodr. X, 472; Ldb. Fl. Ross. III, 241; Boiss. Fl. or. IV, 451; Pflanzenfam. IV, 3b, 86; Schmalh. Fl. II, 274; Wulff in Tr. Tifl. bot. sada, XV, 101; Römpf in Fedde Repert. Beih. L. 119; Grossh. Fl. Kavk. III, 385; Kryl. Fl. Zap. Sib. X, 2459; Keller in Bot. Közl. XXXVII, 3–4, 147; Stroh in Beih. Bot. Centralbl. LXI, 424.—*V. repens* Gilib. fl. lith. 1(1781) 108.—*lc.*: Rchb. Ic. fl. Germ. XX, tab. 85, 1706, f. I–II; Fedtsch. and Fler. Fl. Evrop. Ross. fig. 818; Syreistsch. Fl. Mosk. gub. III, 146; Vestn. Tifl. bot. sada, 28, fig. 18, Hegi. Illustr. Fl. Mittel-Eur. IV, 1, tab. 238, f. 5; f. 26 c, d. Javorka és Csapody, Iconogr. fl. Hung. f. 3293.—*Exs.*: GRF, No. 1127; Pl. Finl. exs. No. 915; Fl. pol exs. No. 224.

Perennial. Plant caespitose, 10–35(50) cm tall, uniformly hirsute, with patent, simple, short hairs in inflorescence. Stem procumbent and rooting, ascending in upper part. Leaves obovate or oblong, 1.5–4 cm long, 1–2 cm broad, narrowed into short, broad petiole, dentate-serrate or crenate, entire at base, acute or obtuse, pubescent with simple hairs on both surfaces. Flowers in lateral, often solitary, not opposite, racemes on



thick peduncles, in upper leaf axils. Pedicels pilose, shorter than or equaling bracts and calyx, erect in fruit. Bracts lanceolate-oblong, subobtuse, covered with simple hairs. Calyx 4-partite, with lanceolate, subobtuse lobes, glandular-pubescent. Corolla 6–7 mm across, pale lilac or sky-blue, with dark veins, sometimes whitish with lilac-colored veins, slightly exceeding or 2 times as long as calyx, with lobes 1/3 united into tube; corolla limb with 3 broad-ovate, subobtuse lobes and 1 oblong lobe 1/2 as broad as others. Stamens generally exserted, with large, broad-ovate anthers. Capsule almost 2 times as long as calyx, compressed, obdeltoid, 4–5 mm long, 4–5 mm broad in upper part, narrowed at base, truncate, obtuse or shallowly emarginate above, glandular-pubescent; style exceeding capsule. Seeds plano-convex, 1 mm broad. June to September.

In forests, along forest edges, in meadows, in mountains up to subalpine zone. *Arctic Region*: Arctic Europe (Khibiny Station); *European USSR*: Karelia-Lapland, Dvina-Pechora, Baltic Region, Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Upper Dniester, Bessarabia. Crimea, Lower Don. *Caucasus*: Ciscaucasia, Dagestan, western and eastern Transcaucasia, Talysh. *Soviet Far East*: Sakhalin (introduced, rare). *General distribution*: Scandinavia, Central and Atlantic Europe, Balkan states-Asia Minor, Iran. Described from Western Europe. Type in London.

Series 8. *Galathicae* Boriss.—*Pentasepala* Römp in Fedde, Repert. Beih. L (1928) 97, gruppe. p.p.—*Austriacae* Riek in Fedde, Repert. LXXIX (1935) p.p.—Stem woody at base, branched, Leaves entire, sessile, coriaceous, almost reflexed along margin, cuneate, densely pubescent. Racemes long, lateral. Capsule oblong-ovate with rounded base. Seeds flat, biconvex.

91. *V. galathica* Boiss. Fl. or. IV (1879) 448; Trautv. in Tr. Peterb. bot. sada, IX (1884) 68; Wulff in Tr. Tifl. bot. sada, XV, 103; Römp in Fedde, Repert. Beih. L, 103; Grossh. Fl. Kavk. III, 385; Stroh in Beih. Bot. Centralbl. LXI, 414.

Perennial. Stem 15–25 cm tall, woody at base, procumbent or partially ascending, profusely branched, firm, subglabrous or crispate-pubescent, densely leafy. Leaves coriaceous, sessile, 15–22 mm long, 4–7 mm broad, oblong or oblong-lanceolate, cuneate at base, subacute, almost reflexed along margin; leaves on lower branches with few teeth along margin, other leaves entire, all leaves pellucid-punctate, with both surfaces grayish due to crispate pubescence, more dense on upper surface. Racemes many-flowered, erect, about 15 cm long, in upper leaf axils. Pedicels erect, almost equaling capsule. Bracts lanceolate, shorter than pedicels. Calyx lobes lanceolate, obtuse. Capsule about 6 mm long, 4 mm broad, oblong-ovate, with rounded base, obscurely emarginate, pubescent. Seeds flat, biconvex, obscurely rugose. May.

On calcareous slopes and rocks in middle mountain zone.—*Caucasus*: western Transcaucasia (Kutaisi). Endemic. Described from Galati in vicinity of Kutaisi. Cotype in Leningrad.

Series 9. *Aphyllae* Römpf in Fedde, Repert. Beih. L (1928) 123, gruppe.—Small high-altitude and arctic plants, caespitose at base. Stem partially ascending, densely leafy or plants with leaves in rosette. Leaves sessile or short-petiolate, entire. Inflorescence almost corymbose, consisting of several, only lateral, axillary, few-flowered clusters. Pedicels 2–5 times as long as calyx. Calyx 4-partite, shorter than corolla. Capsule exceeding calyx. Seeds plano-convex.

92. *V. aphylla* L. Sp. pl. (1753) 11; C. Koch, Monogr. Veron. 24; Ldb. Fl. Ross. III, 245; Boiss. Fl. or. IV, 450; Pflanzenfam. IV. 3b, 86; Römpf in Fedde, Repert. Beih. L, 125; Stroh in Beih. Bot. Centralbl. LXI, 425.—*V. depauperata* Waldst. and Kit. Pl. rar. Hung. 3 (1812) 272; C. Koch, l.c.—*lc.*: Waldst. and Kit. l.c. tab. 245; Hegi, Illustr. Fl. Mittel-Eur. VI, I, tab. 239, f. 4; Javorka és Csapody, Iconogr. fl. Hung. f. 3284.—*Exs.*: Pl. pol. exs. No. 254.

Perennial. Rootstock slender, long, creeping. Plant caespitose (1)5–10 cm long, with reduced stems (1–3 cm long) and leaves almost in rosette. Stems short, glabrous, somewhat pubescent below, slender, rooting. Leaves oblong-ovate or obovate-elliptical, short-petiolate, entire or finely crenate-dentate, pubescent along margin, crowded in lax radical rosette. Flowers 1–5 in axillary umbellate clusters, on scapiform peduncles, in upper leaf axils. Pedicels 2–3 times as long as bracts and calyx. Calyx 4-partite, with ovate-oblong or oblong subobtusate lobes. Corolla 6–8 mm long, blue, sky-blue or pink, 3 times as long as calyx; corolla limb with 4 unequal lobes, 1 orbicular and 3 ovate. Stamens included. Capsule obovate-cordate, patently glandular-pubescent, 2 times as long as calyx, with rounded base, compressed, with short curved style, almost 1/2 as long as capsule. Seeds numerous, orbicular, 1.5 mm broad. Flowering from June to August. Fruiting from July to August.

In subalpine and alpine zones, in open places on rocks. *European USSR*: Upper Dniester. *General distribution*: Central and Southern Europe, Balkan States-Asia Minor. Described from the Alps of Southern Europe. Type in London.

93. *V. baumgartenii* Roem. and Schult. Syst. veg. I (1817) 100; C. Koch, Monogr. Veron. 17; Pflanzenfam. IV, 3b. 86; Römpf in Fedde, Repert. Beih. L. 126; Keller in Bot. Közl. XXXVI, 3–4, 150; Stroh in Beih. Bot. Centralbl. LXI, 925.—*V. petraea* Baumg. Enum. stirp. transsilv. I (1816) 21, non Stev.—*V. pauciflora* Kit. ex Link in Jahrb. I, 3 (1820) 42.—*lc.*: Vozn. rosl. URSR, fig. 231, Javorka és Csapody, Iconogr. fl.

Hung. f. 3285; Prodan, Fl. determ. and descr. pl. Roman. II, tab. 95.—*Exs.*: Fl. exs. Reipubl. Boh.-Slov. No. 1170.

Perennial. Rootstock slender, horizontal. Plant 3–10(15) cm tall. Stem partially ascending, densely and uniformly appressed puberulent in upper part or subglabrous, densely leafy, caespitose. Leaves opposite, sessile, lower leaves ovate, orbicular or oblong, 0.5–1.5 cm long, 3–10 mm broad, 452 subobtusate, with cuneate base; upper leaves oblong or oblong-lanceolate, acute, sparsely denticulate. Inflorescence subcorymbose, consisting of several lateral, axillary, opposite clusters, 1.5–4.5 cm long, with 2–4 flowers. Pedicels filiform, 3–5 times as long as calyx lobes, 7–15 mm long. Bracts linear, 1/3–1/2 as long as pedicels. Calyx 4-partite, subglabrous, shorter than corolla, about 4 mm long, with broadly oblong lobes. Corolla blue, 2 times as long as calyx, with 4 unequal lobes, upper lobe orbicular, 2 lateral lobes ovate, and lower lobe oblong. Stamens included. Capsule glabrous, 2 times as long as calyx, ovate or suborbicular-ovate, about 6 mm long, 4 mm broad, obscurely emarginate, with slender curved style, almost equaling or 1/2 as long as capsule. Seeds plano-convex, broadly ovate or orbicular, about 1.25 mm in diameter, inserted at base, with wavy margin, almost smooth, with round hilum on convex surface. Flowering in July. Fruiting from July to August.

On dry stony slopes in alpine and subalpine zones. *European USSR*: Upper Dniester. *General distribution*: Balkan States-Asia Minor (northern part), Central Europe (Hungary), Described from Transylvania. Type in Berlin.

94. *V. grandiflora* Gaertn. in Nov. Comment. Acad. Imp. Petrop. XIV (1770) 531; Römpf in Fedde, Repert. Beih. L, 125; Hulten. Fl. Kamtsch. IV. 97; Kom. Fl. Kamch. III, 67; Stroh in Beih. Bot. Contralbl. LXI, 425.—*V. kamtschatica* L. fil. Suppl. Syst. veg. (1781) 83; Pflanzenfam. IV, 3b, 86.—*V. kamtschatica* F.F. Gmel. Syst. 2, 1 (1791) 29; Georgi, Besch. Russ. Reich, III, 4, 648.—*V. aphylla* Georgi, l.c.; Kom. Putesh. na Kamch. 212.—*V. aphylla* var. *kamtschatica* Willd. Sp. pl. 1 (1797); 60.—*V. aphylla*  $\beta$ . Willd. l.c.; Roem. and Schult. Syst. veg. I. 104.—*V. aphylla*  $\beta$ . *grandiflora* Benth, in DC. Prodr. X (1846) 476; Ldb. Fl. Ross. III, 245; Miyabe, Fl. Kuril. 253; Fedtsch. Fl. Komand. ostr. 95; Kudo, Fl. Paramush. 155.—*lc.*: Gaertn. l.c. tab. 18, f. 1.

Perennial. Rootstock slender, prostrate, branched, with white underground shoots. Stem 5–15 cm tall, erect, simple, densely leafy, pubescent with soft, partly glandular hairs. Leaves opposite, slender, ovate, 2–4.5 cm long, 1.5–3 cm broad, obscurely crenate-serrate or subentire, cuneate at base, short-petiolate, hairy beneath and along margin with long articulate hairs, or leaves only sparsely ciliate. Peduncles 1–3, axillary, pilose, exceeding vegetative terminal shoots. Inflorescence 4–8-flowered, flowers on



453 pedicels 2 times as long as calyx and bracts. Calyx lobes subobtusely, ovate-lanceolate, 2 times as long as broad, pilose. Corolla 8–9 mm long, bright blue, with 2 lateral lobes broadly ovate, upper orbicular-reniform, lower oblong, much narrower than others. Stamens glandular above, slightly exerted, filaments broadened below, dark violet, anthers cordate. Style exceeding petals, slender, long, curved; nearly equaling mature capsule. Capsule 9–11 mm long, 7–8 mm broad, ovate. Seeds slightly notched, flat. July to August.

In meadows, among stones, on grassy slopes in alpine zone. *Soviet Far East*: Kamchatka, Sakhalin (northern Kuril Islands). *General distribution*: Beringia, Japan. Described from Kamchatka. Type lost.

*Note*. Hulten (Fl. Kamtsch. IV. 99) distinguishes var. *latifolia* Hult. with broad-elliptical leaves, subsessile, glabrous on both surfaces, ciliate and puberulent peduncles and calyces.

Series 10. *Scutellatae* Benth. in DC. Prodr. X (1846) 475, subsec. p.p. Römpf in Fedde, Repert. L. 135, gruppe, p.p.—Plants of damp habitat. Stems slender, rooting. Leaves linear, dentate with retrorse teeth or entire. Racemes lateral, axillary, solitary, lax. Pedicels slender, long, sometimes recurved in fruit. Calyx 4-partite. Capsule compressed, broader than long. Seeds plano-convex or flat.

95. *V. scutellata* L. Sp. pl. (1753) 12; C. Koch, Monogr. Veron. 20; Bge. in Ldb. fl. alt. I, 28; Benth. in DC. Prodr. X, 475; Ldb. Fl. Ross. III, 244; Pflanzenfam. IV, 3b, 86; Schmalh. Fl. II, 274; Wulff in Tr. Tifl. bot. sada, XV, 114; Römpf in Fedde, Repert. Beih. L. 142; Kryl. Fl. Zap. Sib. X, 2461; Grossh. Fl. Kavk. III, 387; Kom. Fl. Kamch. III, 67; Stroh in Beih. Bot. Centralbl. LXI, 422.—*V. scutellata*  $\beta$ . *pilosa* Vahl, Enum. I (1805) 70; Ldb. Fl. Ross. III, 244.—*V. scutellata* var. *teplouchowi* Korsh. Tent. fl. Ross. or. (1898) 316.—*Id.*: Rchb. Ic. fl. Germ. XX, tab. 82, 1703; f. II–III, tab. 212, 1833; Fedtsch. and Fler. Fl. Evrop. Ross. fig. 821; Syreistsch. III. fl. Mosk. gub. III, 143; Vestn. Tifl. bot. sada, 28, fig. 28; Hegi. Illustr. Fl. Mittel-Eur. VI, 1, tab. 237, f. 3; Javorka ès Csapody, Iconogr. fl. Hung. f. 3283.—*Exs.*: GRF, No. 474; Fl. Cauc. exs. No. 495; Pl. Finl. exs. No. 911; Fl. pol. exs. No. 470; Fl. exs. Reipubl. Boh.-Slov. No. 1171; Hayek, Fl. Stir. exs. No. 386.

Perennial. Rootstock slender, long. Plant glabrous or sometimes pubescent (var. *pubescens* Schmalh.), 8–50 cm tall. Stem slender, ascending, with trailing and rooting shoots at base, weak, terminating in leafy shoots, generally branched, not fistular. Leaves opposite, 2–5 cm long, 3–7 m broad, narrowly lanceolate or linear, sessile, acute, regularly retroserrate, glandular under teeth, sometimes entire. Racemes axillary, borne singly in one of opposite leaves, many-flowered, lax; flowers on very slender pedicels, many times exceeding calyx, sometimes recurved in



fruit. Bracts lanceolate. Calyx with 4 lanceolate or oblong lobes.  $1/3-1/2$  as long as corolla and capsule. Corolla 4–5 or 2.5–3 mm across, pale sky-blue or whitish, with pink or dark blue stripes; 2 corolla lobes orbicular (upper and lower) and 2 ovate (lateral); all lobes obtuse. Stamens slightly shorter than corolla. Capsule compressed, ovate or reniform, 4–5 mm broad, broader than long, bilobed, with deep, narrow sinus  $1/3$  its length, rounded at base; style  $1/3-1/2$  as long as or longer than sinus. Seeds flat, peltate, round or oval, 1–1.8 mm in diameter. May to September.

In damp meadows, marshes, on shoal, in forest, forest-steppe and steppe regions, in mountains up to 1800 m. *Arctic Region*: Arctic Europe (Khibiny Station); *European USSR*: Karelia-Lapland, Dvina-Pechora, Baltic Region, Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Trans-Volga Region, Volga-Don, Bessarabia, Black Sea Region, Upper Dniester, Crimea, Lower Don, Lower Volga; *Caucasus*: Ciscaucasia, eastern and southern Transcaucasia; *Western Siberia*: Ob' Region, Upper Tobol, Altai Mountains; *Eastern Siberia*: Lena-Kolyma, Angara-Sayan; *Soviet Far East*: Kamchatka, Sakhalin; *Soviet Central Asia*: Aral-Caspian Region, Balkhash Region. *General distribution*: Scandinavia, Central Europe, Japan. Described from Western Europe. Type in London.

*Note*. A polymorphic plant. Var. *pilosa* Vahl., l.c. a plant with sparse patent hairs, occurs along with typical form, but rarely. Var. *glandulosa* Wulff l.c. is a glandular form, in grassy marshes of Georgia. Var. *tephouchovii* Korsh. l.c. is a glandular form, in grassy with paired racemes, pilose stems and leaves, in the vicinity of Molotov, near the village of Ilinskoe. Sugarwara (Sugarwara, Illustr. Fl. Saghal. IV (1940) 1611, tab. 752) has also described a form with a ciliate capsule, a style twice as long as the shallow sinus, oblong-ovate seeds, depressed above and at base, pubescent stems with projecting, sharp, erect and articulate hairs, oblong, and acute calyx lobes almost half as long as capsule.

96. *V. callitrichoides* Kom. Fl. Kamch. III (1930) 70; Stroh in Beih. Bot. Centralbl. LXI, 424.

Perennial. Rootstock slender, profusely branched. Stems numerous, erect, 10–12 cm tall, densely leafy, glabrous. Leaves lanceolate, 5–10 mm long, 2–2.5 mm broad, acute, narrowed at base into short petiole, appearing entire, teeth along leaf margin visible only under magnifying lens. 455 Racemes axillary, 1–3-flowered; flowers on filiform, slender, glabrous pedicels up to 3 mm long. Corolla about 1 mm long, with 3 identical, ovate-orbicular lobes. Stamens with reduced filaments and diverging anthers. Ovary orbicular with distinct notch at base of rather long style. August.

In damp areas at edges of ponds. *Soviet Far East*: Kamchatka. Endemic. Described from foothills of Shapochka Mountain. Type in Leningrad.

Series 11. *Montanae* Boriss.—*Scutellatae* Benth. in DC, Prodr. X (1846) 475, pro subsect. p.p.—Stems rooting. Leaves ovate or suborbicular-ovate, petiolate. Racemes lax, axillary, alternate, in middle leaf axils, few-flowered. Pedicels slender, long, erect in fruit. Calyx 4-partite. Capsule reniform with lobes connate for considerable part, glandular-pubescent, with dentate-ciliate margin. Seeds plano-convex, smooth.

97. *V. montana* L. Sp. pl. (1762) 17; C. Koch, Monogr. Veron 18; Benth. in DC. Prodr. X, 475; Ldb. Fl. Ross. III, 244; Pflanzenfam. IV, 3b, 86; Schmalh. Fl. II, 274; Wulff in Tr. Tifl. bot. sada, XV, 115; Grossh. Fl. Kavk. III, 387; Stroh in Beih. Bot. Centralbl. LXI, 422.— *Ic.*: Rchb. Ic. fl. Germ. XX, tab. 84, 1705, f. III–IV; Fedtsch. and Fler. Fl. Evrop. Ross. fig. 822; Hegi, Illustr. Fl. Mittel-Eur. VI, 1, fig. 34a, b; Javorka es Csapody, Iconogr. fl. Hung. f. 3294.— *Exs.*: Fl. pol. exs. No. 550; Fl. exs. austro-hung. No. 2619; Fl. Ital. exs. No. 1120; Fl. exs. Reipubl. Boh.-Slov. No. 364.

Perennial. Stem 10–15 cm, decumbent, slender, somewhat diffusely pilose, patently so in inflorescence. Leaves with 1–2 long petioles, ovate or cordate-ovate, rarely orbicular-ovate, 1–3 cm broad, 1.5–3.5 cm long, run-cinate or crenate-serrate, with truncate base. Racemes weak, lax, 2–7 flowered, axillary. Pedicels glandular, 2–4 times as long as calyx and bracts, narrowly linear, elongated and diverging in fruit. Calyx 4-partite, with spatulate-ovate, subacute lobes, rather large, glandular. Corolla 6–12 cm across, pale lilac or lilac, sometimes whitish sky-blue with dark stripes; corolla limb with 3 orbicular and 1 oblong lobes. Capsule compressed, reniform, 0.7–0.8 cm broad, 0.5–0.6 cm long, exceeding calyx, broad, obscurely emarginate, dentate-ciliate along margin, glandular-pubescent; style exceeding 1/2 capsule length. Seeds 2 mm long, 1.5 mm broad, peltate, suborbicular, plano-convex, smooth. May to July.

In shady and damp places in broad-leaved forests, in mountains and foothills up to 1500 m. *European USSR*: Baltic Region (Latvia), Volga-Kama (vicinity of Zlatoust), Upper Dnieper, Upper Dniester; *Caucasus*: western Transcaucasia. *General distribution*: Scandinavia, Central and Atlantic Europe, western Mediterranean Region. Described from Western Europe. Type in London.

456 Series 12. *Urticifoliae* Boriss.—*Scutellatae* Benth. in DC. Prodr. X (1846) 475, pro subsect. p.p.—Stem erect, glandular in upper part. Leaves large, ovate-cordate, sessile or short-petiolate. Racemes in upper leaf axils, opposite, lax, many-flowered. Pedicels extremely diverging, curved in fruit. Calyx 4-partite. Capsule orbicular-ovate or ovate. Seeds flat.

98. *V. maxima* Mill. Gard. Dict. ed. VII (1768) 111.—*V. urticifolia* Jacq. Fl. Austr. I (1773) 37, non Pall. (1800), non St. Lag. (1881) non Boiss. Fl. or. IV, 448; L. f. Sp. pl. Suppl. 83, C. Koch, Syn. fl. Germ. 603; Schmalh. Fl. II, 276; Kryl. Fl. Zap. Sib. X, 2460; Stroh in Beih. Bot. Centralbl. LXI, 422.—*V. latifolia* Lam. Fl. fr. 2 (1778) 441, non L.; non L. f. l.c.; C. Koch, Monogr. Veron. 193.—*Veronicella urticaefolia* Fourr. in Ann. Soc. Linn. Lyon, N. S. XVII (1869) 128.—*l.c.*: Jacq. l.c. tab. 59; Rchb. Ic. fl. Germ. XX, tab. 82, 1703, f. I; tab. 212, 1833; f. III; Fedtsch. and Fler. Fl. Evrop. Ross. fig. 819; Hegi. Illustr. fl. Mittel-Eur. VI, I, tab. 238, f. I; Javorka és Csapody, Iconogr. fl. Hung. f. 3292.—*Exs.*: Fl. exs. austro-hung. No. 920; Hayek, Fl. Stir. exs. No. 668; Billot, Fl. Germ. exs. No. 1729.

Perennial. Stem (10)30–70 cm tall, simple, erect, sparsely pubescent with patent, hispid, sometimes glandular hairs, patently glandular-puberulent in inflorescence. Leaves sessile or lower leaves short-petiolate, broad, ovate or oblong, with cordate or truncate base, unequally sharply denticulate, with acute tip; upper leaves long acuminate, middle leaves 4–8 cm long, 2–5 cm broad, subcordate at base, acuminate, sparsely hairy beneath or on both surfaces, especially along margin and veins. Racemes opposite, in upper leaf axils, lax, many-flowered, on slender pedicels. Bracts pubescent, oblong-lanceolate to linear, subobtuse,  $1/2$ – $2/3$  as long as pedicels, with ciliate margin. Pedicels extremely diverging, upcurved and appressed to stem in fruit, 2–3 times as long as calyx, puberulent and sparsely glandular. Calyx 4-partite, with lanceolate, obtuse, 459 unequal lobes, glandular-ciliate, especially along margin. Corolla 4–7 mm across, pale pink or pale sky-blue, with dark stripes, sometimes reddish, 2 times as long as calyx, with very short tube with 5 veins, glabrous in throat; corolla limb with 3 orbicular-ovate and 1 ovate lobes; all lobes obtuse, ciliate along margin and beneath, largest lobe about 3 mm in diameter, with dark veins. Stamens 5–8 mm long, exserted or slightly shorter (var. *uralensis* Boriss.) with erect white filaments, violet, ovate anthers. Capsule orbicular-ovate or ovate, puberulent when young, later glabrous, markedly shallowly emarginate, about 4 mm in diameter or broader than long; style much exceeding sinus, equaling capsule, very slender. Seeds flat, orbicular-ovate or ovate, 1–1.25 mm long, 0.75–1 mm broad, obtuse or subacute, light, yellowish. June to July.

Dry mountain forests, rocks, debris, at 1000–2000 m and in forest-steppe zone. *European USSR*: Upper Dniester (Carpathian Mountains). Volga-Kama (Central Urals). *General distribution*: Central and Atlantic Europe. Described from Austria. Type in London.

*Note*. Ural Plants (var. *uralensis* Boriss.) are similar in appearance to Carpathian plants, distinguished by their seeds — ovate, subacute at



apex, 1 mm long and 0.75 mm broad, and by their stamens that equal the corolla.

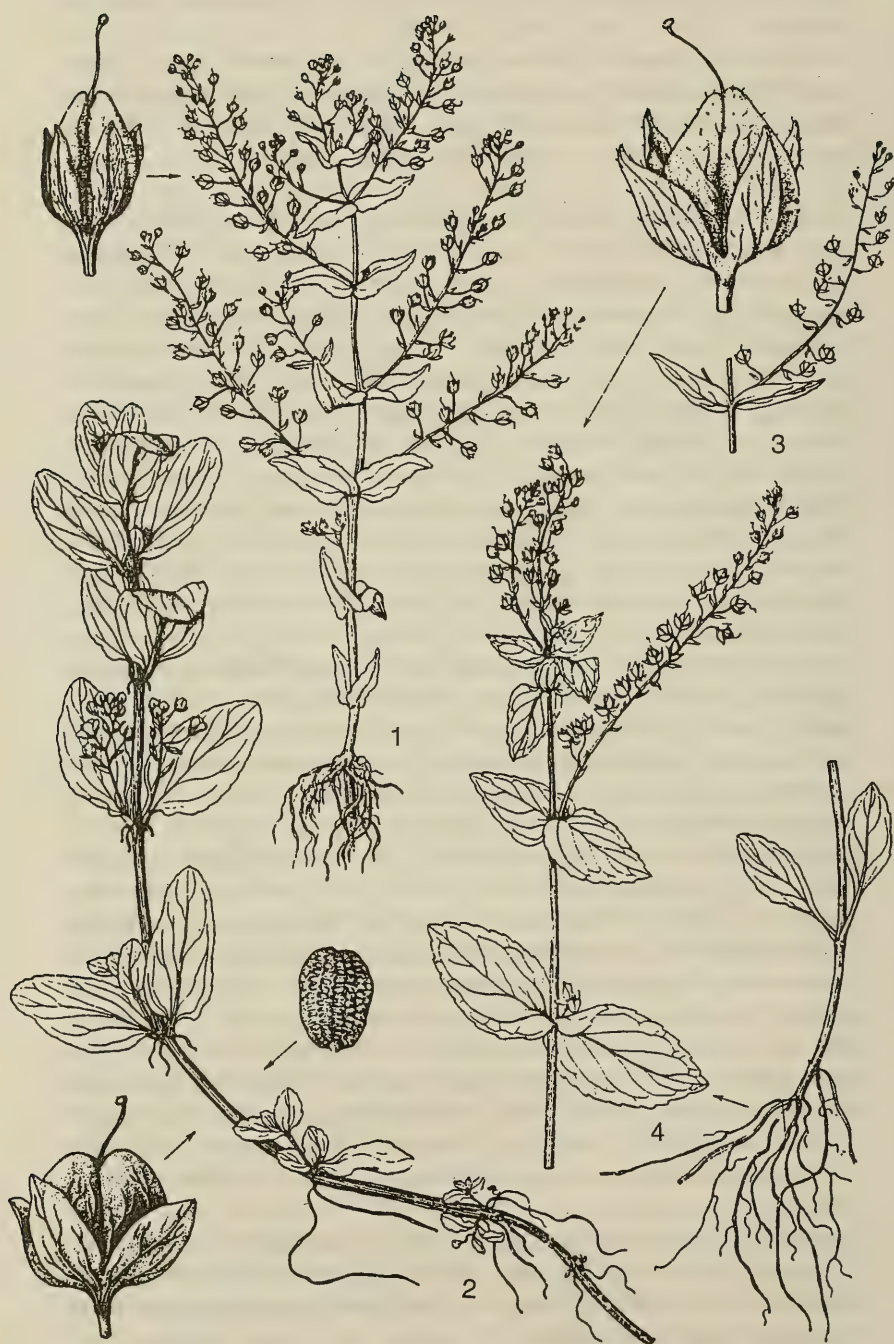
Series 13. *Minutae* Boriss—Trailing, Caespitose small plants. Stems densely leafy. Leaves short-petiolate or sessile, orbicular to linear-lanceolate. Inflorescence terminal and axillary, few-flowered. Calyx 4-partite. Capsule broader than long. Seeds plano-convex.

99. *V. minuta* C.A.M. Verz. Pflanz. Cauc. Casp. Meer (1831) 105; Benth. in DC. Prodr. X, 476; Ldb. Fl. Ross. III. 245; Boiss. Fl. or IV, 451; Kusnezow in Del. pl. I. VI, 28; Wulff. in Tr. Tifl. bot. sada, IV, 84; Grossh. Fl. Kavk. III, 392.—*V. liwanensis* Römpf in Fedde, Repert, Beih. L (1928) 59, p.p. non C. Koch.—*V. telephiifolia* Römpf l.c.—p.p. non Vahl.—*V. telephiifolia* Vahl var. *minuta* (C.A.M.) Trautv. in Tr. peterb. bot. sada, V (1877) 465.—*V. repens* Clarion ex Trautv. in Radde, Bericht. Biol.-Geogr. Unters. Kauk. I (1866) 158.—*V. euphrasiaefolia* Stroh in Beih. Bot. Centralbl. LXI (1942) 419, p.p. non Link.—*V. euphrasiaefolia* var. *glareosa* (Somm. and Lev.) Stroh, l.c.—*V. orbicularis* Fisch. ex. Trautv. in Bull. Acad. Pétersb. X (1866) 397. *V. glareosa* Som. and Lev. in Nuov. Giorn. Bot. Ital. nuov. ser. IV (1897) 206.—*l.c.*: Tr. Peterb. bot. sada, XVI, tab. XXXIX, f. 1–7.

460 Perennial. Roots slender, numerous. Plant diffusely pubescent or glabrous. Stem with scale leaves in lower part, almost filiform, profusely branched, trailing, rooting, with partially ascending short branches, 2–5 cm tall. Leaves not fleshy, 5–8 mm long and broad, obovate, spatulate or orbicular, entire or with few obscure obtuse teeth, short-petiolate. Floral leaves reduced, sessile, elliptical. Racemes terminal, short, few-flowered (1–3); sometimes a few clusters appear in upper leaf axils, exceeding leaves, lax, few-flowered, on short peduncles, eglandular. Bracts oblong-ovate or elliptical. Pedicels erect or diverging, 2–4 times as long as bracts and calyx, white-pilose. Calyx with 4 obovate or oblong lobes, with cuneate base, obtuse, white-pilose along margin. Corolla sky-blue 2, times as long as calyx, about 7 mm across; corolla limb rotate, with 3 orbicular and 1 orbicular-reniform lobes. Stamens equaling corolla. Capsule compressed, slightly exceeding calyx, suborbicular, about 4 mm long, broader than long, pubescent or subglabrous, emarginate, bilobed; style almost equaling capsule. Seeds few, flat or suborbicular, minute, weakly rugose, with large hilum. June to July.

On pebbly and stony mountain slopes, among debris, in alpine zone. *Caucasus*: Ciscaucasia, Dagestan, western, eastern and southern Transcaucasia. *General distribution*: Armenia-Kurdistan. Described from western Caucasus. Type in Leningrad.





100. *V. kopetdaghensis* B. Fedtsch. in Fl. Turkm. VI (1954) 27; Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR XVII (1955).

Perennial. Rootstock slender, elongated, woody, profusely branched. Stems numerous, branched, 5–8(10) cm tall, slender, partially ascending or ascending, forming loose turf. Plant covered throughout with very short (under magnifying lens), minute, simple and erect hairs, glandular in upper part of plant. Leaves opposite, 4–5(8) mm long, 2–4 mm broad, deltoid-ovate or ovate-oblong, broadest at truncate or rounded base, obtuse, crenate and often reflexed along margins, sometimes subentire, glabrous or subglabrous above, somewhat puberulent beneath, petiole slender, about 1–1.5 mm long. Racemes terminal lax. 2–8-flowered. Pedicels slender, erect, 2–3 times as long as bracts and calyx very minutely (only under lens) glandular-puberulent, as also the inflorescence. Bracts 1–3.5 mm long, 1.5–2 mm broad, elongated, oblong, obtuse, entire, puberulent. Calyx 4-partite, 2–3 mm long, puberulent; calyx lobes oblong, subobtuse, united at base. Corolla blue, rotate, 7–9 mm across; limb with 3 orbicular and 1 oblong lobes. Stamens included, with rounded anthers and dark filaments. Ovary bilocular, glabrous. Capsule cordate, with shallow, obtuse  
461 sinus, cuneate at base, puberulent along margin and on surface, slightly exceeding calyx; style slender, long, exceeding capsule. Seeds not known. Flowering from June to July.

In stony regions and near melting snow banks, at 2300–3000 m. *Soviet Central Asia*: mountainous Turkmenia (Rizagali and Chapandag Mountains). *General distribution*: Iran, Described from Central Kopet-Dag. Type in Leningrad.

101. *V. telephiifolia* Vahl, Enum. pl. I (1805) 65; C. Koch, Monogr. Veron. 25; Benth. in DC Prodr. X, 477; Ldb. Fl. Ross. III, 246; Boiss. Fl. or. IV, 450; Kuznetsov in Del. pl. Exs. Jur. I. 28; II, 55; III, 73; Wulff in Tr. Tifl. bot. sada, XV, 99; Grossh. Fl. Kavk. III, 386; Römpf in Fedde, Repert. Beih. L. 59. p.p.; Stroh in Beih. Bot. Centralbl. LXI, 398.—*V. liwanensis* C. Koch in Linnaea, XXII (1849) 698, Römpf in Fedde, Repert. L. 59. p.p.; Grossh. Opred. rast. Kavk. 312.—*V. calverti* Boiss. ex. Tschich. As. Min. II (1866) 41; Boiss. Fl. or. IV, 450.—*V. telephiifolia*  $\beta$ . *pilosula* Boiss. Fl. or. IV, 450.—*V. telephiifolia* var. *liwanensis* O. Ktze. in Tr. Peterb. bot. sada, V (1887) 224; Wulff l.c. 100.—*V. euphrasiaefolia* Link var.

#### Plate XXI.

*Veronica anagalloides* Guss, general appearance of plant, capsule.—2. *V. becabunga* L., general appearance of plant, capsule, seed.—3. *V. anagallidiformis* Boreau, portion of inflorescence in fruit.—4. *V. bobrovii* Nevski, portion of plant, capsule.

*liwanensis* (C. Koch) Stroh, l.c. 419.—*l.c.*: Vestn. Tifl. bot. sada, 28, fig. 16.

Perennial. Roots slender. Plant bluish gray, pubescent (under magnifying lens). Stem slender, 3–20 cm long, prostrate, branched from base, terminating into leafy shoots. Leaves imbricate, obovate to oblong, 0.3–1 cm long, fleshy, glabrous or scattered-hairy along veins, somewhat thick, short-petiolate, with 2–5 obtuse teeth, rarely entire, acute, base cuneate. Racemes short, ovate, lax, axillary, single, sometimes opposite, on long pubescent peduncles. Pedicels glandular-pubescent, filiform, 2–3 times as long as calyx and ovate-oblong bracts. Calyx lobes 4, obovate to lanceolate, obtuse, almost equaling or shorter than capsule. Corolla sky-blue, exceeding calyx. Capsule 5–6 cm broad, 3 mm long, compressed, bilobed, with rounded base, glabrous, somewhat deeply emarginate; style equaling or 1.5 times as long as capsule. Seeds 5–10 in locule, ovate-orbicular, flat, slightly biconvex, about 1 mm long, with slightly radially rugose margin. Flowering from May to August.

On stony slopes of alpine and subalpine zones. *Caucasus*: western, eastern and southern Transcaucasia. *General distribution*: Armenia-Kurdistan (Artvin district), Iran. Described from Ararat. Type in Berlin.

102. *V. glabrifolia* Boriss. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XVII (1955).—*V. petraea* var. *glabriuscula* Wulff in Tr. Tifl. bot. sada, XV (1915) 98, p.p.

- 462 Perennial. Roots slender. Plant 10–15 cm tall. Stem 5–8 cm tall, with 2 opposite rows of soft hairs, otherwise glabrous, somewhat flexuous, partially ascending, leafy. Leaves sessile or subsessile, lower leaves ovate, middle oblong to lanceolate, upper lanceolate to linear-lanceolate; leaves with 1–3 teeth along margin or subentire, glabrous. Flowers in axillary, lax racemes, 2–4 times as long as vegetative shoots, peduncles slender, glabrous, (5)8–15 cm long. Pedicels slender, 3–4 times as long as glabrous bracts. Bracts oblong or ovate, 1–2 mm long. Calyx about 3 mm long, 4-partite, united at base; lobes united at base, oblong ovate, subacute, glabrous, or sparsely hairy along margins. Corolla rotate, 10–13 mm across, sky-blue, hairy in throat, united into tube at base, limb with 4 lobes, 5–6 mm long, 3 lobes almost identical, orbicular or broadly ovate, 0.5 mm long. Style equaling capsule and calyx, curved. Capsule cordate, 5 mm broad, 3 mm long, base cuneate, sinus shallow, lobes obtuse, short, glabrous, diverging at obtuse angle. Seeds orbicular-ovate, 0.75 mm long, 0.5 mm broad, planoconvex, with hilum in middle. June to July (Plate XX, fig. 2).

On rocks and stony slopes.—*Caucasus*: Dagestan, eastern Transcaucasia, Endemic. Described from Balkaria. Type in Leningrad.



*Note.* Well distinguished from *V. petraea* Stev. and *V. propinqua* Boriss., by glabrous calyces, plano-convex seeds, glabrous peduncles 3–4 times as long as the vegetative shoots at flowering stage, lax, few-flowered racemes and stems with two opposite rows of hairs.

Subsection 2. *Naviculares* Boriss.—Plant generally caespitose. Seeds scaphoid.

Series 14. *Multiflorae* Wulff in Tr. Tifl. bot. sada, XV (1915) 105, p.p.—*Caucasicae* Riek in Fedde, Repert. Beih. LXXIX, 10, p.p.—Stems numerous, procumbent or erect, 14–50 cm tall. Leaves sessile or short-petiolate, orbicular to oblong. Racemes many-flowered, lax, axillary. Pedicels several times exceeding calyx. Calyx 4-partite, lobes acute, subequal. Capsule orbicular, slightly broader than long, base rounded. Seeds scaphoid, large, 2–3 in locule.

103. *V. peduncularis* M.B. Besch. d. Länder (1800) 126; M.B. Fl. taur.-cauc. I, 11; C. Koch, Monogr. Veron. 17; Benth. in DC. Prodr. X, 473; Boiss. Fl. or. IV, 439; Schmalh. Fl. II, 275, p.p.: Wulff in Tr. Tifl. bot. sada, XV, 105; Römpf in Fedde, Repert. Beih. L, 133, p.p.; Grossh. Fl. Kavk. III, 387; Riek in Fedde, Repert. Beih. LXXIX, 50; Stroh in Beih. Bot. Centralbl. LXI, 420.—*V. peduncularis* M.B. var. *genuina* Trautv. in Tr. Peterb. bot. sada, X (1887) 124.—*V. peduncularis* M.B. var. *dissecta* Somm. and Lev. in Tr. Peterb. bot. sada, XVI (1900) 372.—*V. dissecta* Somm. and Lev. ap. Riek, l.c. 51.—*V. incisa* Bordzilowsky ap. Riek. l.c.—*V. chamaedrys*  $\gamma$  *peduncularis* Ldb. Fl. Ross. III (1847–1849) 243, p.p.—*V. secundiflora* C. Koch, in Linnaea, XVII (1843) 288; Benth. in DC. Prodr. X, 489; Ldb. l.c. 255.—*V. phoenicantha* C. Koch in Linnaea, XVII (1843) 288.—*V. benthami* C. Koch ex Boiss. l.c.—*V. nemorum* Pall. ex Link, Jahrb. I, III (1820) 42; C. Koch, Monogr. Veron. 17.—*Ic.*: Buxbaum, Cent. I, 396, tab. 46, f. 4; Vestn. Tifl. bot. sada, 28, fig. 9; Juel in Acta Horti Berg. I, No. 5, tab. 2, f. 2; Riek, l.c. tab. II, 7.—*Exs.*: GRF, No. 731.

Perennial. Stems numerous, 14–30 cm long, ascending or procumbent, with 2 rows of rigid hairs, terminating into leafy shoots. Leaves short-petiolate and sessile, ovate or oblong, upper leaves orbicular, coarsely dentate from base, sinuate-serrate or incised, with irregular teeth at leaf apex, glabrous or appressed hispid. Racemes opposite, somewhat lax, long, in upper leaf axils, exceeding stem. Lower bracts oblong, obscurely dentate, others broadly linear, entire, 2–3 times as long as calyx. Pedicels 4–5 times as long as calyx, 10–15 mm long, filiform, divergent. Calyx lobes oblong, acute. Corolla with very short tube, white, with red stripes in throat, with 5 veins at base, exceeding calyx; 3 lobes broad, obtuse, ovate-reniform, broader than long, 1 lobe oblong, sometimes bilobed. Stamens included, curved. Capsule slightly laterally compressed, almost equaling



calyx, about 5 mm broad, broader than long, with rounded locules, broadly emarginate at obtuse angle, with rounded or truncate base. Seeds scaphoid, large, 2–3 in locule. April to June.

On stony slopes and among shrubs, in forests, in middle and low-altitude zones.—*European USSR*: (?) Crimea; *Caucasus*: Ciscaucasia, Dagestan, eastern and southern Transcaucasia. *General distribution*: Armenia-Kurdistan. Described from Caucasus. Type in Leningrad (?).

Series 15, *Petraeae* Wulff in Tr. Tifl. bot. sada, XV (1915) 97, pro §1.—Short. Caespitose plants. Leaves sessile or subsessile, suborbicular to lanceolate, often entire, very rarely pinnately lobed. Inflorescence terminal  
464 and axillary. Racemes on distinct peduncles, few-flowered, corymbose at flowering stage. Pedicels 2 or several times as long as calyx. Calyx 4-partite. Capsule orbicular to reniform, often broader than long. Seeds scaphoid, smooth.

104. *V. petraea* (M.B.) Stev. in Mém. Soc. Nat. Mosc. III (1812) 245, 250; V. 340, p.p.; M.B. Fl. taur.-cauc. III, 12, p.p.; C. Koch, Monogr. Veron. 18, p.p.; Benth. in DC. Prodr. X, 476, p.p.; Ldb. Fl. Ross. III, 245, p.p.; Boiss. Fl. or. IV, 440, p.p.; Schmalh. Fl. III, 276, p.p.; Wulff in Tr. Tifl. bot. sada, XV, 97, p.p.; Grossh. Fl. Kavk. III, 386, p.p.; Riek in Fedde, Repert. Beih. LXXIX, 47, p.p.—*V. petraea* Stev. var. *typica* Trautv. in Tr. Peterb. bot. sada, V (1877) 464.—*V. petraea* var. *microphylla* Trautv. l.c.; Radde in Mus. Cauc. II (1901) 136.—*V. peduncularis* M.B. γ. *petraea* M.B. Fl. taur.-cauc. I (1808) 11.—*V. mthiuletica* Kem.-Nath. in Fl. Gruz. VII (1952) 567; Zam. po sist. i geogr. rast. Gruz. Akad. Nauk, 18.—*Ic.*: Fl. Gruz. VII, fig. 349.

Perennial. Light green, caespitose plant, sparsely crispate-puberulent throughout. Stem slender, procumbent, partially ascending, branched, 10–15 cm tall, densely leafy. Leaves subsessile, ovate or suborbicular, 13–25 mm long, base rounded or cordate, abruptly narrowed into short petiole, with few large teeth, with reflexed margin; upper leaves sometimes entire, glabrous and rugose above, pubescent with white crispate hairs and prominent veins beneath. Racemes terminal, few-flowered, lax, axillary, on long peduncles. Bracts ovate, entire or lobed. Pedicels 2–3 times as long as calyx and bracts. Calyx lobes broadly ovate or oblong-ovate, equaling or scarcely exceeding capsule, densely pilose. Corolla sky-blue, 2.5 times as long as calyx. Capsule glabrous, broader than long, shallowly emarginate, with suborbicular base. Seeds scaphoid, smooth, about 1 mm long, 0.75 mm broad. May to July.

Among debris and stony slopes of alpine and subalpine zones. *Caucasus*: Dagestan (southern part), eastern Transcaucasia (Baku, Nukha).

Endemic. Described from Shakhdag and Tufandag, in Dagestan. Type in Leningrad.

105. *V. propinqua* Boriss. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XVII (1955).—*V. petraea* Stev. in Mém. Soc. Nat. Mosc. III (1812) 245, p.p.

465 Perennial. Plant with numerous slender roots, caespitose. Stem procumbent and partially ascending, 10–15 cm tall, crispate-puberulent. Leaves opposite, subsessile, short-petiolate, oblong to elliptical and lanceolate, 10–25 mm long, base cuneate, margin with few, often obtuse teeth or entire, subacute or subobtuse, glabrous or sparsely hairy. Racemes elongated in fruit, on densely glandular-pubescent peduncles, almost equaling subtending leaves. Pedicels 1.5–2 times as long as calyx and bracts, densely glandular. Bracts lanceolate. Calyx lobes oblong, subobtuse, densely glandular-hairy, about 4 mm long. Corolla sky-blue, about 7 mm across, lobes 1 mm united into tube; 3 lobes orbicular, 1 oblong. Stamens included, anthers ovoid. Style exceeding calyx. Capsule 3–4 mm broad, 4 mm long, with obtuse, erect lobes, shallowly emarginate, rounded at base, glandular-pubescent. Seeds about 1 mm broad, 2 mm long, scaphoid, smooth. Flowering May to June. Fruiting June to July.

In alpine meadows, on rocks, on stony slopes of cliffs, among debris.—*Caucasus*: Ciscaucasia, Dagestan, eastern Transcaucasia. Endemic. Described from Dagestan. Type in Leningrad.

*Note*. Distinguished from *V. petraea* Stev. s.s. by the darker green color, more elongated, subglabrous, oblong to lanceolate leaves, obscure veins and cuneate base, lanceolate bracts, shorter and many-flowered inflorescence, oblong calyx lobes, densely glandular capsule and larger seeds.

106. *V. baranetskii* Bordz. in Protok. Kievsk. obsch. estestv. za 1907–1908 (1909) p. XXXI; Grossh. Fl. Kavk. III, 386; Stroh in Beih. Bot. Centralbl. LXI, 419.—*V. sintenisii* Hausskn. ex Bornmüller in Fedde, Repert. X (1912) 422, 472.—*V. petraea* Römpf in Fedde, Repert. Beih. L (1928) 133, non Stev.; Riek in Fedde, Repert. Beih. LXXIX, 47.—*V. petraea* ssp. *baranetskii* (Bordz.) Wulff in Tr. Tifl. bot. sada, XV (1915) 98.—*V. petraea* var. *integerrima* Trautv. in Tr. Peterb. bot. sada, IV (1876) 399; Grossh. Fl. Kavk. III, 386.—*Exs*: Sintenis, Iter orient. No. 5584.

Perennial. Caespitose, green plant. Stems few, prostrate or with partially ascending branches, whitish, crispate-puberulent. Leaves erect, oblong-lanceolate to linear-lanceolate, subcuneate at base, tapering, obtuse, entire or with 2–3 small teeth at tip, margin reflexed; lower leaves short-petiolate, others sessile; all leaves glabrous above, sparsely hairy beneath along very prominent veins. Racemes single, dense at flowering

stage, rather lax in fruit, peduncles short; upper part of inflorescence  
 466 axis, pedicels and calyx glandular-hairy. Bracts oblong, villous mainly  
 along margin, sometimes glandular-hairy near base. Pedicels slender,  
 1.5–2 times as long as bracts, distant and upcurved in fruit. Calyx  
 4-partite, lobes oblong, acute. Corolla sky-blue, 2 times as long as calyx.  
 Capsule obcordate, broader than long, emarginate, base rounded, margin  
 sparsely ciliolate. Seeds scaphoid, notched, ovate or orbicular. May to  
 July.

On stony slopes, in middle and upper mountain belt, up to alpine  
 zone.—*Caucasus*: western, eastern (Georgia) and southern Transcaucasia.  
*General distribution*: Balkan States-Asia Minor, Armenia-Kurdistan, Iran  
 (?). Described from vicinity of Akhalkhalaki. Type in Leningrad. Cotype  
 in Kiev.

107. *V. oltensis* Woron. in Sched. ad Woron. and Schelk. Herb. Fl.  
 Cauc. fasc. II–IV (1914) 76; Wulff in Tr. Tifl. bot. sada, XV, 168.—*V. tele-*  
*phifolia* var. *livanensis* (C. Koch) O. Ktze, f. *incisa* Wulff ex Woron. l.c.;  
 Wulff l.c. (emend.).

Perennial. Roots slender, becoming woody. Stems numerous,  
 branched, partially ascending, forming loose turf. Plant puberulent  
 throughout with simple crispate hairs. Leaves sparsely pilose, opposite,  
 with 3–5 mm long petioles, ovate, 7–10 mm long, pinnately incised  
 into 5–7 obtuse oblong and ovate lobes; middle and sometimes also  
 lateral lobes with 2 small teeth at base; lower leaves 3-lobed. Racemes  
 lateral, lax, few-flowered. Pedicels and inflorescence axis covered with  
 wavy hairs; pedicels erect, 2 times as long as calyx. Bracts oblong-  
 lanceolate, about 3 mm long, less than 1/2 length of pedicels, subglabrous,  
 obtuse. Calyx 4-partite, with unequal, oblong-lanceolate lobes, united  
 at base, glabrous outside, sparsely, puberulent inside. Corolla glabrous,  
 about 10 mm across; lobes 4, ovate, similar in pairs. Stamens at least  
 1/2 as long as corolla, with dark filaments and ovoid anthers. Capsule  
 glabrous, about 3 mm long, orbicular-cordate, with small sinus, lobes  
 divergent at right angle, rounded at base, exceeding calyx; style slender,  
 curved, almost equaling capsule. Seeds elliptical, about 1 mm long,  
 0.5 mm broad, narrowed toward base, obtuse above, smooth, scaphoid.  
 May.

On rocks.—*Caucasus*: Possibly grows in southern Transcaucasia.  
*General distribution*: Armenia-Kurdistan (former Kara Province). De-  
 scribed from vicinity of the village of Olty. Type in Leningrad.

Series 16. *Microcarpae* Boriss.—Caespitose plant. Stems becoming  
 woody in lower part. Leaves petiolate, entire, small, obovate-orbicular.  
 467 Racemes many-flowered, lateral. Calyx 4-partite. Capsule shorter than  
 calyx, orbicular, slightly compressed. Seeds scaphoid, smooth.



108. *V. microcarpa* Boiss. Diagn. pl. or., I, 4 (1844) 76; Benth. in DC. Prodr. X, 473; Boiss. Fl. or. IV, 441; Wulff in Tr. Tifl. bot. sada, XV, 103; Römpf in Fedde, Repert. Beih. L, 115; Grossh. Fl. Kavk. III, 385; Riek in Fedde, Repert. Beih. LXXIX, 45; Stroh in Beih. Bot. Centralbl. XVI, 418.—*Exs.*: Fl. Cauc. exs. No. 494.

Perennial. Plant puberulent, velutinous, grayish, with glandular hairs in inflorescence, blackening when dry. Stems numerous, 5–15(20) cm tall, prostrate or partially ascending, lower part strong, becoming almost woody. Leaves petiolate, obovate-orbicular, 5–13 mm long, 3–13 mm broad, entire, cuneate at base, cristate-crenate, with regular, obtuse and sometimes almost binate teeth and incisions. Racemes about 5 cm long, in 2–6 upper leaf axils, opposite, on long peduncles, many-flowered, dense in fruit, 5–15 cm long. Pedicels erect, longer than or almost equaling oblong or oblong-lanceolate bracts and calyx, glandular-hairy. Calyx shorter than corolla, lobes 4, oblong or oblong-lanceolate, obtuse, unequal. Corolla blue (f. *coerulea* Grossh.) or pinkish violet (f. *rosea* Grossh.), more than 2 times as long as calyx. Stamens included. Capsule slightly shorter than calyx 2.5–3 mm long, orbicular, slightly compressed, slightly broader than long, with acute sinus, pubescent; style slender, flexuous, 3 times as long sinus. Seeds about 1 mm long, scaphoid, smooth on convex surface. May to June.

On stony, rubbly, arid, sometimes saline slopes, on pebble-beds, in low-altitude zone, up to 900–1500 m. *Caucasus*: southern Transcaucasia (Nakhichevan, Ordubad). *General distribution*: Iran (southern part). Described from Iran. Type in Geneva; Cotype in Leningrad.

Series 17. *Armenae* Boriss.—Caespitose plants. Leaves sessile, short, pinnately incised at base into linear lobes. Racemes lateral, lax, short. Calyx 5-partite, 5th lobe small, caducous. Capsules glabrous, broader than long. Seeds scaphoid.

109. *V. armena* Boiss. and Huet, Diagn. pl. or. II, 3 (1856) 166; Boiss. Fl. or. IV, 441; Wulff in Tr. Tifl. bot. sada, XV, 134; Römpf in Fedde, Repert. Beih. L, 111; Grossh. Fl. Kavk. III, 389; Riek in Fedde, Repert. Beih. LXXIX, 13; Stroh in Beih. Bot. Centralbl. XLI, 418.—*lc.*: Riek, l.c. tab. 2, 8.—*Exs.*: Pl. or. exs. No. 318.

468 Perennial. Roots strong. Plants bright green, blackening when dry, forming dense turf. Stems 7–10 cm tall, ascending or decumbent, sometimes erect, numerous, blackish, slender, becoming woody at base, asperate with very short, crispate indumentum, visible under magnifying lens. Leaves sessile, short, pinnately incised at base into very slender, linear, crisped lobes, 8–12 mm long. Racemes in upper leaf axils, on short peduncles, lax, short. Pedicels slender, divergent in fruit, 2–3 times as long as oblong-lanceolate bracts. Calyx 5-partite, subglabrous or asperate due to



sparse, minute hairs; lobes oblong, subobtusate,  $1/5$  as long as pedicels, unequal; 1 lobe longer than others, smallest lobe often caducous. Corolla deep sky-blue, 2–3 times as long as calyx. Capsule with erect or curved stalk, glabrous, obcordate, small, 3–4 mm long, about 4 mm broad, emarginate; style long, filiform, curved. Seeds ovate, scaphoid, about 1.5 mm long, 1 mm broad, rugose. Flowering May to June (Plate XX, fig. 4).

On stony slopes of high-altitude zone.—*Caucasus*: eastern and southern Transcaucasia. *General distribution*: Armenia-Kurdistan. Described from vicinity at Erzerum. Type in Geneva. Cotype in Leningrad.

Section 8. *Beccabunga* Griseb. Spicil. fl. Rum. and Bith. II (1844) 31; Benth. in DC. Prodr. X, 467; Ldb. Fl. Ross. III, 235; Boiss. Fl. or. IV, 435; Pflanzenfam. IV, 3b, 86; Wulff in Tr. Tifl. bot. sada, XV, 87; Römpf in Fedde, Repert. Beih. L, 147, p.p.; Stroh in Beih. Bot. Centralbl., LXI, 426, p.p.—*Beccabunga* Fourr. in Ann. Soc. Linn. Lyon, No. 5, XVII (1869) 128.—Racemes opposite, axillary. Flowers distinctly pedicellate. Bracts small. Calyx 4-partite. Corolla with short tube, small, rotate. Capsule dehiscent from 4 apical teeth, later bilobed, with valves separating on one or both sides, often inflated, rarely slightly laterally compressed, obtuse or obscurely emarginate, rarely acute. Seeds 10–30 in locule, ovate or oblong, slightly compressed, minute, asperate. Stems terminating into leafy shoots, appearing from rootstock rooting at nodes. Leaves opposite, lanceolate to ovate and orbicular, often thick, not deeply parted. Perennials, rarely annual herbs, mainly of northern hemisphere, confined primarily to aquatic and moist habitats.

Series 1. *Anagallides* Keller in Bot. Közl. XXXIX, 3–4 (1942) 139, pro subsect.—Leaves generally sessile, rarely lower leaves short-petiolate.  
469 Stems obscurely 4-angled. Inflorescence generally glandular. Capsule usually orbicular or orbicular-ellipsoid, with small sinus, sometimes subacute.

110. *V. anagallis aquatica* L. Sp. pl. (1753) 12; Wulff in Tr. Tifl. bot. sada, XV, 89; in Fedde. Repert. Beih. XC, 4; Stroh in Beih. Bot. Centralbl. LXI, 426, p.p.—*V. anagallis* auct. plur.: C. Koch, Monogr. Veron. 20; M.B. Fl. taur.-cauc. I, 10: III, 10; Benth. in DC. Prodr. X, 467; Pflanzenfam. IV, 3b, 86; Ldb. Fl. Ross. III, 236, p.p.; Boiss. Fl. or. IV, 437; Schmalh. Fl. II, 273; Römpf in Fedde, Repert. Beih. L, 159; Kryl. Fl. Zap. Sib. X, 2454; Keller in Boi. Közl. XXXIX, 3–4, 144; Grossh. Fl. Kavk. III, 384.—*V. anagallis*  $\beta$ . *aquatica* Neir. Fl. Nied. Oest. II (1859) 553.—*V. osiliensis* Lucé. Topogr. Nachr. Ösel (1823) 4.—*V. ambigua* Lucé, l.c.—*V. pusilla* Benth. in DC. l.c. 468, p.p.—*V. acutifolia* Gilib. Exerc. Phyt. I (1792) 119.—*V. comosa* Richter ex Stapf in Denkschr. Acad. Wien, 50, II (1885) 24, p.p.—*Beccabunga anagallis* Fourr in Ann. Soc. Linn. Lyon, N.S. XVII (1869) 128.—*Ammania caspica* Janka in Oesterr. Bot. Zeitschr. VI (1856) 315, non M.B.—*l.c.*: Fedtsch.

and Fler. Fl. Evrop. Ross. fig. 815: Syreistsch. Ill. fl. Mosk. Gub. III, 144; Rchb. Ic. fl. Germ. XX, tab. 81; Hegi, Illustr. Fl. Mittel-Eur. VI, 1. f. 35 c-d; Vestn. Tifl. bot. sada, 28, fig. 7; Javorka ès Csapody, Iconogr. fl. Hung. f. 3287.—*Exs.*: Pl. Finl. exs. No. 912; Fl. exs. Reipubl. Boh.-Slov. No. 266.

Perennial. Rootstock prostrate, rooting, thick. Plant glabrous, sometimes sparsely glandular-pubescent above. Stem 10–80(150) cm tall, cylindrical or obscurely 4-angled, fistular, erect, ascending at base, branched or simple. Leaves opposite, sessile (lower sometimes subsessile), 2–10 cm long, 0.5–4 cm broad, ovate, oblong-ovate or often lanceolate to linear, often cordate-semiamplexicaul at base, sometimes connate at base, short-pointed (sometimes subobtusate), entire or serrate-dentate, crenate, shining, 1- or 3-veined. Racemes in axils of upper opposite leaves, crowded at stem ends, exceeding leaves, many-flowered, appearing like paniculate inflorescence. Pedicels diverging at acute angle, longer than calyx and linear filiform bracts, sometimes pilose, 4–6 mm long in fruit. Calyx deeply 4-partite; teeth generally exceeding capsule, elliptical, unequal, subacute, with reticulate pattern. Corolla 4–5 mm across, 2.5–4 mm long, whitish to dull violet, with yellow ring in throat, slightly or up to 1.5 times as long as calyx; lobes 4–5 times as long as tube; 3 lobes broadly ovate, all subobtusate. Stamens included, curved, with dull violet anthers. Pedicels in fruit divergent at acute angle. Capsule glabrous or glandular, orbicular to ellipsoid; broader than long, or as broad as long, with small sinus or subacute, not laterally compressed, 2–4 mm long; style 1.5–2 mm long. Seeds ovate, 0.25–0.5 mm long, finely pitted on surface (when highly magnified), biconvex or plano-convex. April to September.

Along banks of rivers and ponds, in moist places, damp meadows, in mountains up to subalpine zone. *European USSR*: Karelia-Lapland, Dvina-Pechora, Baltic Region, Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Trans-Volga Region, Upper Dniester, Bessarabia, Black Sea Region, Crimea, Lower Don, Lower Volga; *Caucasus*: Ciscaucasia, Dagestan, western, eastern and southern Transcaucasia, Talysh. *Western Siberia*: Ob' Region, Upper Tobol, Altai Mountains; *Eastern Siberia*: Yenisey, Angara-Sayan, Dauria; *Soviet Central Asia*: Aral-Caspian Region, Dzh.-Tarbagatai, mountainous Turkmenia. *General distribution*: Scandinavia, Central Europe, Atlantic Europe, Mediterranean Region, Baltic States-Asia Minor, Armenia-Kurdistan, Iran, India-Himalayas, Mongolia, Japan, China. Described from Europe. Type in London.

*Note.* Fruits of *V. anagallis-aquatica* L. are often infested by a weevil (*Gymnetron villosus* Sch.), resulting in spherical galls, markedly changing their shape.

111. *V. anagalloides* Guss. Ic. Pl. rar. (1826) 5, tab. 3; Benth. in DC. Prodr. X, 468; Ldb. Fl. Ross. III, 236; Boiss. Fl. or. IV, 437; Pflanzenfam. IV, 3b, 86; Römpf in Fedde, Repert. Beih. L, 160, p.p.; Grossh. Fl. Kavk. III, 384.—*V. anagalloides* L.  $\beta$  *tenuis* Boiss. Fl. or. (1879) 437.—*V. anagallis* var. *anagalloides* (Guss.) C. Koch in Linnea XVII (1843) 288; Schmalh. Fl. II, 273.—*V. anagallis* var. *macra* Trautv. in Tr. Peterb. bot. sada, II, 2 (1873) 574 p.p.—*V. anagallis* C.A.M. Verz. Pflanz. Kauk. Casp. Meer. (1831) 105, non L.—*V. tenuis* Ldb. Fl. alt. (1829) 38; Ldb. Fl. Ross. 237.—*Ik.*: Ldb. Ic. fl. Ross. tab. 217; Rchb. Ic. fl. germ. XX, tab. 81, 1702, f. III, 14; Fedtsch. and Fler. Fl. Evrop. Ross. fig. 865; Javorka és Csapody, Iconogr. fl. Hung. f. 3286; Hegi, Illustr. Fl. Mittel-Eur. VI, 1, f. 35; *Exs.*: Fl. Hung. exs. No. 453; Fl. Ital. exs. No. 150; Fl. exs. austro-hung. No. 2621.

Annual or perennial. Rootstocks rooting. Plant 10–30 cm tall. Stem erect, slender, solid, not fistular, somewhat patently pilose, puberulent or sometimes glabrous, often glandular. Leaves sessile, cordate-semiamplexicaul at base, lanceolate or linear-lanceolate, acuminate, entire  
473 or shallow crenate, 1.5–2.5 cm long, about 7 mm broad, lower leaves sometimes short-petiolate. Racemes dense, many-flowered, axillary, appearing generally in axils of upper opposite leaves, glabrous or sparsely glandular. Bracts linear, often patently pilose. Pedicels very slender, often patently glandular-villous, divergent at acute angle, erect in fruit, slightly, sometimes horizontally diverging, 2–2.5 times as long as calyx and short bracts. Calyx often patently scattered glandular-villous, 4-partite, with unequal, subobtuse, elliptical teeth, almost 2 times as long as capsule. Corolla 2–3(5) mm across, whitish, pale sky-blue or dull violet, with dark stripes, almost equaling calyx. Stamens almost equaling corolla. Capsule glabrous or sparsely glandular-hairy, ellipsoid, 2–2.5 mm long 1–1.5 mm broad, almost 2 times as long as broad, obtuse or emarginate, with very small sinus, inflated, not laterally compressed; style included. Seeds minute, orbicular, smooth, plano-convex. June to October (Plate XXI, fig. 1).

On shoals and alluvium, in forest-steppe, steppe and semidesert zones, as weed along roadsides, in pastures.—*European USSR*: Volga-Kama, Middle Dnieper, Trans-Volga Region, Upper Dniester, Black Sea Region, Lower Don; *Caucasus*: Ciscaucasia, Dagestan (?). western, eastern and southern Transcaucasia Talysh; *Western Siberia*: Altai Mountains; *Soviet Far East*: Ussuri; *Soviet Central Asia*: Aral-Caspian Region, Balkhash Region, Dzh.-Tarbagatai, mountainous Turkmenia, Syr Darya, Pamiro-Alai, Tien Shan. *General distribution*: Central Europe, Mediterranean Region, Balkan States-Asia Minor, Armenia-Kurdistan, Iran, India-Himalayas, North Africa. Described from France. Type in Paris.



112. *V. anagallidiformis* Boreau, Fl. centr. de la France, ed. 3, II (1857) 489; Keller in Bot. Közl. XXXIX, 3-4, 142.—*V. aquatica* Bernh. Begriff d. Pflanzenart. (1834) 66, non S.F. Gray (1821); Schlenker in Fedde, Repert. Beih. XC, 14, p.p.; Grossh. Fl. Kavk. III, 384; Stroh in Beih. Bot. Centralbl. LXI, 428; Keller, l.c. 146.—*V. comosa* Richter ex Stapf in Denkschr. Akad. Wiss. Wien, 50, II (1885) 24, p.p.; Mansfeld in Fedde, Repert. Beih. XLIX, 47.—*V. acutifolia* Javorka, Iconogr. fl. Hung (1929) 3288, non Gilib.—*l.c.*: Hegi, Illustr. Fl. Mittel-Eur., VI, 1 (1918), f. 35; Javorka ès Csapody, l.c. No. 3288.—*Exs. Fl.*: exs. austro-hung. No. 1620.

Annual, perennial. Plant 15-50(80) cm tall, glabrous or rarely with isolated hairs. Stem ascending at base or erect, fistular, weekly 4-angled, terminating into leafy shoots. Leaves sessile, semiamplexicaul, horizontally divergent, ovate to lanceolate, 20-50 mm long, 12-25 mm broad, acute or subobtuse, generally entire or serrate-dentate. Inflorescence lax, glandular or glabrous (var. *glabra* Boriss.), racemes axillary appearing  
 474 from axils of opposite leaves, somewhat divergent, lax. Pedicels in flower and fruit horizontally divergent, often with incurved capsule, firm, slightly longer than capsule and obtuse elongated bracts, thickened. Calyx 4-partite, with obtuse, lanceolate-ovate lobes, shorter than or sometimes equaling capsule. Corolla whitish with red veins to dull violet, less than 4-5 mm across. Capsule orbicular-ellipsoid, slightly broader than long, slightly exceeding calyx, not laterally compressed, obtuse, with very small acute sinus; style shorter than capsule. Seeds 0.5 mm long. April to September (Plate XXI, fig. 3).

Near water or in standing water, scattered in forest, forest-steppe and steppe zones, in saline soils and swamps.—*European USSR*: Baltic Region, Ladoga-Ilmen, Volga-Kama. Upper Dnieper, Middle Dnieper, Volga-Don, Trans-Volga Region, Black Sea Region, Crimea (rare), Lower Don, Lower Volga; *Caucasus*: Ciscaucasia, western, eastern and southern Transcaucasia, Talysh; *Western Siberia*: Irtysh; *Eastern Siberia*: Irkutsk, Trans-Baikal Region: *Soviet Central Asia*: Aral-Caspian Region, Dzh.-Tarbagatai, mountainous Turkmenia, Tien Shan (western part), Pamiro-Alai. *General distribution*: Scandinavia, Central and Atlantic Europe, Mediterranean Region, Balkan States-Asia Minor, Armenia-Kurdistan, Iran, India-Himalayas, Japan, China, Described from France. Type in Paris.

113. *V. scardica* Griseb. Spicil. fl. Rum. and Bith. II (1844) 31; Römpp in Fedde, Repert. Beih. L, 161; Schlenker in Fedde, Repert. Beih. XC, 31; Stroh in Beih. Bot. Centralbl. LXI, 429; Keller in Bot. Közl. XXXIX, 3-4, 149.—*V. gracilis* Uechtr. ex Velenovsky in Abh. math.-nat. Cl. Böhm. Ges. Wiss. VII, 1 (1886) 35.—*V. velenovskyi* Uechtr. in





Engl. Bot. Jahrb. VIII (1887) 46.—*l.c.*: Schlenker, l.c. tab. I, 4; Javorka ès Csapody, Iconogr. fl. Hung. f. 3289.

Perennial. Stems partially ascending at base or erect, slender, obscurely 4-angled, 5–20(40) cm tall, glabrous, fistular, numerous, rarely single, branched or simple, with elongated internodes. Lower leaves short-petiolate, ovate or orbicular, middle and upper leaves petiolate or with narrowed base, subsessile, ovate or oblong-rhombic, 1–2(3) cm long, rarely larger, glabrous, somewhat dentate or subentire, acute. Racemes axillary, 3–6 times as long as supporting leaves, glabrous, lax in fruit, with 10–20 regularly spaced capsules. Pedicels slender, 5–8 mm long in fruit, diverging at right angle, rarely at acute angle, somewhat recurved in fruit, 2–5 times as long as small, narrowly lanceolate bracts. Calyx 1/3–1/2 as long as pedicels; lobes acute or oblong-obovate. Corolla scarcely exceeding calyx, pale bluish lilac or bright sky-blue, lobes orbicular. Capsule orbicular-ellipsoid, slightly compressed, with thin valves, 2–3 mm long, slightly broader than long, glabrous, with or without small sinus, subob-  
475 tuse at tip and base, equaling calyx or nearly so; style 1–1.5 mm long, very slender, scarcely shorter than calyx. Seeds numerous, elliptical, somewhat plano-convex, compressed, minute, verrucose, yellowish, fimbriate. May to June.

In damp meadows.—*European USSR*: Bessarabia. *General distribution*: Central Europe, Mediterranean Region, Balkan States. Described from Western Europe. Type in Geneva.

114. *V. poljensis* Murbeck in Österr. Bot. Zeitschr. 43 (1893) 365; Schlenker in Fedde, Repert. Beih. XC, 29; Stroh in Beih. Bot. Centralbl. LXI, 429.—*V. anagalloides* Römpf in Fedde, Repert. Beih. L (1928) 160 p.p.—(?) *V. anagallis* var. *umbrosa* Koschewn. in Bull. Soc. Nat. Mosc. 51, 2 (1876) 297.—*V. anagallis* b. *villosa* Bge. ex Schmalh. Fl. II (1897) 273.

Perennial or annual. Stem erect, arcuate at base, 10–35 cm tall, cylindrical or 4-angled, fistular, glabrous. Cauline leaves sessile, semiamplexicaul, narrowly lanceolate, subacute or acute, denticulate or serrate, lower leaves subentire. Inflorescence axis densely pilose throughout. Pedicels in fruit slender, arcuate-upcurved, equaling bracts or 2 times as long, also densely pilose with multicellular hairs. Calyx almost

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Plate XXII.

*Veronica lütkeana* Rupr., general appearance of plant, corolla, capsule, seed.—2. *V. ciliata* Fisch., general appearance of plant, corolla, capsule, seed.—3. *V. gorbunovii* Gontsch., general appearance of plant, corolla, capsule, seed.—4. *V. densiflora* Ldb., general appearance of plant, corolla, seed, capsule.

tomentose with long multicellular simple hairs; lobes oblong-lanceolate, subacute, equaling mature capsule or slightly shorter. Corolla 3–3.5 mm across, white with pink stripes on upper and lateral lobes. Capsule suborbicular, 3–3.8 mm long, 2.7–3.4 mm broad, somewhat densely puberulent, obscurely emarginate; style at least 1/2 as long as capsule. June.

On muddy banks.—*European USSR*: Upper Dnieper (Poltava), Middle Dnieper (Kursk), Volga-Don (Tambov, vicinity of Voronezh), Lower Volga (Ergeni), *General distribution*: Southern Europe. Described from Herzegovina (Gackopolje). Type in Lund.

Series 2. *Eubeccabungae*. Keller in Bot. Kozl. XXXIX, 3–4 (1942) 155, pro subsect.—All leaves petiolate. Stems cylindrical. Entire plant including inflorescence glabrous. Capsules subglobose, with very small sinus.

115. *V. beccabunga* L. Sp. pl. (1753) 12; M.B. Fl. taur.-cauc. I. 9; C. Koch, Monogr. Veron. 19; Benth. in DC. Prodr. X, 468; Ldb. Fl. Ross. III, 237; Boiss. Pl. or. IV, 438; Pflanzenfam. IV, 3b, 86; Schmalh. Fl. II, 273; Wulff in Tr. Tifl. bot. sada, XV, 88; Römpf in Fedde, Repert, Beih. L, 157; Grossh. Fl. Kavk. III, 384; Stroh in Beih. Bot. Centralbl. LXI, 429; Kryl. Fl. Zap. Sib. X, 2455.—*V. muscosa* Korsh. Ocherki rast. Turkest. (1895) 96.—*V. tenerrima* F.W. Schmidt in Mayer, Samml. Phys. Aufs. I (1791) 198.—*V. beccabunga* var. *tenerrima* (F.W. Schmidt) Kryl. Fl. Alt. (1907) 944.—*V. hjuleri* Pauls. Pl. Coll. in As. Med. and Pers. IV (1907) 212; Pavlov in Vestn. Akad. Nauk. KazSSR, No. 6, 45.—*V. rotundifolia repens* Gilib. Fl. lith. (1781) 117.—*V. rotundifolia* Gilib. Exerc. Phyt. I (1792) 120.—*V. rotundifolia erecta* Gilib. Fl. lith. (1781) 116.—*Beccabunga vulgaris* Fourr. in Ann. Soc. Linn. Lyon. N.S. XVII (1869) 128.—*Ic.*: Fedtsch. and Fler. Fl. Evrop. Ross. fig. 816; Syreistsch. Ill. fl. Mosk. gub. III, 145; Rchb. Ic. fl. Germ. XX, tab. 80, 1701; Hegi. Illustr. Fl. Mittel-Eur. VI, 1, tab. 237, f. 6; Javorka ès Csapody, Iconogr. fl. Hung. f. No. 3290.—*Exs.*: GRF, No. 1676 a, b; Fl. pol. exs. No. 760; Pl. Finl. exs. No. 913.

Perennial. Rootstock long, oblique, horizontal. Plant (5)10–60 cm tall. Stem rooting at base, ascending or erect in upper part, generally branched, subcylindrical, glabrous, rarely sparsely glandular-pubescent above, not fistular. Leaves opposite, narrowed into 5–7 (up to 15) mm long petiole; lamina orbicular to oblong-ovate, rarely lanceolate, 1–7 cm long, 0.5–2.5 cm broad, obtuse or subobtuse, serrulate, dentate or crenate, sometimes subentire, with rounded or subcuneate base, somewhat thick, glabrous, shining, dark green. Racemes axillary, opposite, lax, with 10–30 flowers, glabrous, slightly exceeding or 2 times (rarely more) as long as leaves, flowers on divergent (in lower flowers) glabrous pedicels,



almost equaling small (about 1 mm broad) bracts and calyx or 2 times as long as calyx, 3–6(8) mm long in fruit, curved. Calyx 4-partite, with oblong-lanceolate, acute, subequal, glabrous lobes, scarcely shorter than corolla and almost equaling capsule. Corolla 4–9 mm across, 2.5–4 mm long, pale sky-blue, with blue stripes, bright blue or dark lilac, rarely pink or white, slightly exceeding calyx; upper lobe broadly ovate, sometimes bifid, lateral lobes ovate, lower narrowly ovate. Stamens included, with curved filaments and large ovate anthers. Capsule subglobose, 3–4 mm long, hard, inflated, not laterally compressed, equaling calyx or shorter, glabrous, with or without very small sinus; style erect, 1.5–2 mm long. Seeds ellipsoid, about 0.5 mm long, terete, 20–30 in locule. April to September (Plate XXI, fig. 2).

On banks of rivers, irrigation canals, lakes, in marshes, damp places, distributed in mountains up to alpine zone.—*European USSR*: Karelia-Lapland, Dvina-Pechora, Baltic Region, Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Trans-Volga Region, Upper Dniester, Bessarabia, Black Sea Region, Crimea, Lower Don., Lower Volga; *Caucasus*: Ciscaucasia, Dagestan, western, eastern and southern Transcaucasia, Talysh; *Western Siberia*: Ob' Region, Upper Tobol, Irtysh, Altai Mountains; *Soviet Far East*: Sakhalin (apparently introduced); *Soviet Central Asia*: Aral-Caspian Region, Balkhash Region. Dzh.-Tarbagatai, mountainous Turkmenia, Syr Darya, Pamiro-Alai, Tien Shan. *General distribution*: Scandinavia, Central and Atlantic Europe, Mediterranean Region, Balkan States-Asia Minor, Armenia-Kurdistan, Iran, India-Himalayas, Mongolia, China, Japan, North America. Described from Western Europe. Type in London.

*Note*. A stunted, densely leafy form with small leaves, var. *mucosa* Korsch., is found in the alpine zone of the Central Asian mountains, generally at altitude of about 3600 m.

116. *V. americana* (Rafin.) Schweinitz ex Benth. in DC. Prodr. X (1846) 468: Pflanzenfam. IV, 3b, 86; Römpf in Fedde, Repert. Beih. L, 158; Fedtsch. Fl. Komand. o. 94; Kom. and Alis. Oprod. rast. Dalnevost. kr. II, 924; Stroh, in Beih. Bot. Centralbl. LXI, 430.—*V. anagallis* Ldb. Fl. Ross. III (1847–1849) 236, quoad pl. Kamtsch. non Linn.—*V. beccabunga* var. *americana* Rafin. Med. Fl. 2 (1830) 109.—*V. beccabunga procumbens* Rafin. l.c. Sugawara Illustr. Saghal, IV, 1639.—*V. beccabunga* var. *americana* (Schwein.) Glehn ex Maxim. in Bull. Acad. Pétersb. XXVII (1882) 510; Miyabe, Fl. Kuril. 253.—*l.c.*: Britt. and Brown. Illustr. Fl. USA, ed. 2, III, 200; Sugawara, l.c. tab. 751.

Perennial. Rootstock oblique or horizontal. Plant glabrous, prostrate at base and rooting at lower nodes, shoots 5–50 cm tall. Stem weakly branched, decumbent or partially ascending, cylindrical. Leaves sessile,



somewhat thick, ovate to lanceolate, 3–7 cm long, about 3 cm broad, obtuse or acute, subentire or rather distinctly serrate-dentate above, broadest at base, truncate, rounded or subcordate, sharply narrowed into petiole. Racemes lax, 10–30-flowered, on 3–10 cm long peduncles, axillary, sometimes branched. Pedicels glabrous, horizontally diverging in fruit 4.5 mm–1 cm long or more, 2 times as long as calyx, equaling or 2 times as long as lanceolate bracts. Calyx glabrous, with 4 oblong-lanceolate lobes, about 3–4 mm long. Corolla pink or sky-blue, without stripes, 4–9 mm across. Stamens slightly exserted from corolla. Capsule subglobose, 4–5 mm broad, 3–4 mm long, with or without small sinus, slightly shorter than calyx, glabrous; style 2–3 mm long, often curved, filiform. Seeds 20–30, slightly compressed, about 0.5 mm long, ellipsoid to orbicular weakly rugose. May to August.

In slow-moving waters near banks, in shallow water, partly submerged plants.—*Soviet Far East*: Kamchatka (and Commander Islands), Okhotsk, Uda Region, Sakhalin (and Kuril Islands). *General distribution*: Japan (northern part), Bering Strait, North America, Described from North America.

*Note.* *V. americana* (Rafin.) Schwein, is intermediate between *V. beccabunga* L. and *V. anagallis-aquatica* L. the seeds and capsules are similar to those of the former species, the leaves petiolate as in the latter, but with the petioles shorter and broader.

478 Series 3. *Oxycarpae* Boriss.—Leaves sessile or petiolate. Stems obscurely 4-angled, fistular, subglabrous, glandular above or densely glandular-pubescent throughout. Capsules acute or subacute, broad or oblong-ovoid, rhombic, sometimes suborbicular.

117. *V. beccabungoides* Bornm. in Beih. Bot. Centralbl. XXII, 2 (1907) 111; Schlenker in Fedde, Repert. Beih. XC, 28.

Perennial. Rhizomatous plant, 8–12 cm tall. Stem glabrous or subglabrous, glandular above, partially ascending, erect above. Leaves with about 0.5 cm long petioles, only upper leaves sessile, ovate-orbicular or oblong, 1.2–3 cm long, 1–1.5 cm broad, obtuse, with rounded or cuneate base, obscurely crenate, dentate or subentire, glabrous. Racemes 8–15-flowered, weak, lax, rather densely glandular-pubescent. Bracts shorter than pedicels. Pedicels 3.5–5.5 mm long, slender, erect, diverging at acute or almost right angle, almost 2 times as long as calyx and bracts. Calyx 4-partite, lobes oblong-spatulate, sparsely pubescent or glabrous, shorter than capsule. Corolla pink (?). Capsule broadly ovoid, 2 mm broad, 3 mm long, acuminate or acute, not emarginate, glandular; style included. July.

Possible origin in mountainous Turkmenia. *General distribution*: Iran. Described from Kerman Province. Type in Berlin.

118. *V. montioides* Boiss. Diagn. pl. or. I, 7 (1846) 43; Benth. in DC, Prodr. X, 490.—*V. anagallis-aquatica* auct. non L.: Römpf in Fedde. Repert. Beih. L 59, p.p.: Schlenker in Fedde, Repert. Beih. XC, 4. p.p.: Stroh in Beih. Bot. Centralbl. LXI, 426; p.p.—*V. anagallis-aquatica* var. *montioides* Boiss. Fl. or. IV (1879) 437; Wulff in Tr. Tifl. bot. sada, XV, 92.—*V. pusilla* Benth. in DC. Prodr. X (1846) 468, p.p.; Boiss. Fl. or. IV, 437, p.p.—*V. anagallis* var. *macra* Trautv. in Tr. Peterb. bot. sada, II (1873), 574, p.p. VII (1880) 492.

Annual. Plant glabrous, simple or sparsely branched. Stem ascending or partially so at base, 5–10 cm tall. Lower leaves petiolate or narrowed toward base, ovate, 1–15 mm (sic) long, 8–10 mm broad, slender, entire; upper leaves sessile, ovate or elliptical, sometimes semiamplexicaul, entire or obscurely dentate. Racemes 6–12(15)-flowered. Bracts oblong-ovate, shorter than pedicels. Pedicels slender, upcurved, later almost horizontally divergent, longer than bracts. Calyx with broad-ovate or ovate-elliptical, subobtuse, 2 mm long 1 mm broad lobes, slightly exceeding capsule. 479 Corolla sky-blue, scarcely exceeding calyx. Ovary sparsely ciliate above. Capsule about 3.5 mm long, suborbicular, slightly laterally compressed; style almost equaling capsule. Seeds numerous, minute. July to September.

In rivulets, in shady ravines, at altitude up to 2000 m. *Caucasus*: eastern and southern Transcaucasia; *Soviet Central Asia*: mountainous Turkmenia. *General distribution*: Iran. Described from Iran. Type in Geneva.

119. *V. bobrovii* Nevski in Tr. Bot. Inst. Akad. Nauk SSSR, I, 4 (1937) 321; B. Fedtsch. in Fl. Turkm. VI, 271.

Perennial. Delicate glabrous plant. Stem partially ascending 15–17 cm tall. Lower leaves petiolate, ovate, with distinctly and sparsely crenate-dentate margin, 3.5–4 cm long, 1.7–2.2 cm broad, slender, cuneately narrowed into short, 1.5–2 cm long petiole; upper leaves sessile, oblong-ovate, sharply cuneate-narrowed toward base, with somewhat serrate upper margin. Racemes in upper leaf axils, somewhat lax, 2.5–3.5 cm long, often unilateral; flowers 10 or more. Bracts linear-lanceolate or linear, acute. Pedicels pilose, about 3 mm long, divergent, exceeding bracts. Calyx lobes broadly ovate, subobtuse, 2.5–3 mm long, slightly exceeding capsule. Corolla white, with faint blue stripes, small. Capsule 2.5 mm long ovoid, subacute, glabrous; style almost equaling capsule. Flowering June to July (Plate XXI, fig. 4).

On marshy stony river banks, in ravines. *Soviet Central Asia*: Pamir-Alai (Kugitang). Endemic. Type in Leningrad.

120. *V. michauxii* Lam. Tabl. Encycl. I (1791) 44; Benth. in DC. Prodr. X, 417; Koch, Monogr. Veron. 18; Boiss. Fl. or. IV. 439; Römpf in Fedde Repert. Beih. L, 161; Schlenker, in Fedde, Repert. Beih. XC, 28;

Stroh in Beih. Bot. Centralbl. LXI, 429.—*l.c.*: Jaub. and Spach. Illustr. pl. or. tab. 424.

Perennial. Rootstock prostrate. Stems (5)15–60 cm tall, single or numerous, partially ascending, rooting or erect with short branches above, obscurely 4-angled, fistular, densely glandular-pubescent. Leaves sessile, ovate to lanceolate, rounded or cordate-semiamplexicaul at base, obtuse or subobtuse, with crenate-dentate or entire margin; lower leaves on vegetative lateral shoots, petiolate, sessile on main shoots; leaves somewhat densely glandular-pubescent mainly beneath. Racemes rather dense, in upper leaf axils, on firm peduncles, elongated in fruit. Pedicels erect, scarcely longer than or equaling bracts and calyx, 3–5 mm long in fruit, divergent at acute angle, sometimes incurved, glandular-puberulent. Calyx with ovate or oblong-lanceolate, acute lobes. Corolla reddish or pale violet, about 7 mm broad, exceeding calyx. Capsule about 3–4 mm long, 3–3.5 mm  
480 broad, broadly ovoid or oblong-rhombic, sometimes suborbicular, obtuse, weakly emarginate or subacute, somewhat inflated, hard, generally exceeding calyx; style equaling or slightly exceeding capsule. Seeds about 0.5 mm long, 0.25 mm broad, plano-convex, numerous. Flowering July. Fruiting August.

In river valleys, near irrigation canals, in damp places at 2000–3600 m.—*Soviet Central Asia*: Tien Shan (?), Pamiro-Alai (Pamir, Shugnan). *General distribution*: Iran, India-Himalayas. Described from Khamadan Province. Type in Paris.

121. *V. lysimachioides* Boiss. Diagn. pl. or. II, 3 (1856) 165; Fl. or. IV, 438; Schlenker in Fedde, Repert. Beih. XC, 24; Stroh in Beih. Bot. Centralbl. LXI, 429; VI, 269.—*V. oxycarpa* auct. non Boiss.: Römpf in Fedde, Repert. Beih. L, 162, p.p.; Stroh, l.c. (pl. tauricae); Schlenker, l.c. p.p.; 24 (pl. tauricae).

Perennial. Plant glabrous, 30–90 cm tall. Stem fistular, densely leafy, erect or ascending at base. Leaves sessile, amplexicaul, sometimes connate, oblong-lanceolate, (3)5–8 cm long, 4–10 mm broad, acuminate, denticulate or entire. Racemes in upper leaf axils. 5–15 cm long, 20–200-flowered, very dense, elongated in fruit. Pedicels in flowers and fruits 2.5–3.5 mm long, erect, somewhat incurved, scarcely exceeding bracts and calyx. Bracts setiform, shorter than pedicels. Flowers often unilateral. Calyx with lanceolate acute lobes, slightly shorter than or equaling capsule. Corolla white or pale sky-blue, exceeding calyx. Capsules in dense and long, often somewhat unilateral racemes, appressed to axis, glabrous, ovoid, large, obtuse or weakly emarginate, with rounded base; style almost equaling sinus. Flowering April to May.

Along banks of rivulets and irrigation canals. *European USSR*: Crimea: *Caucasus*: western and southern Transcaucasia: Talysh; *Soviet*



*Central Asia*: mountainous Turkmenia. *General distribution*: Balkan States-Asia Minor, Armenia-Kurdistan. Described from Asia Minor (Lydia). Type in Geneva.

122. *V. oxycarpa* Boiss. Diagn. pl. or. I, 7 (1846) 44; Fl. or. IV, 438; Benth. in DC. Prodr. X, 490; Römpf in Fedde, Repert. Beih. L, 162, p.p.; Schlenker, in Fedde, Repert. Beih. XC, 24; Tr. Bot. inst. Akad. Nauk SSSR, I, 4, 320; Stroh in Beih. Bot. Centralbl. LXI, 429.—*V. oxycarpa* var. *turcmenica* Schlenker, l.c. 26.—*V. michauxii* B. Fedtsch. in Fl. Turkm. VI (1954) 27, non Lam.—*V. anagalloides* var. *maruensis* B. Fedtsch. l.c. 270, in note.—*V. maruensis* B. Fedtsch. l.c.—*l.c.*: Schlenker, l.c. tab. I, f. 2, 3; tab. II.

481 Perennial. Rootstock creeping, rooting. Plant glabrous or glandular-pilose in upper part. Stem (5)10–80(150) cm tall, erect or partially ascending at base, single, rarely few together, fistular, terminating into leafy shoots. Leaves glabrous, 2–8 cm long, 0.5–2.5 cm broad; lower leaves short-petiolate, opposite, sometimes in whorls of 3, obovate or ovate, obtuse, obscurely crenate-serrate; upper leaves sessile, oblong to broadly lanceolate and linear, semiamplexicaul, obscurely, crenate-serrate or entire, acute. Racemes in opposite pairs, axillary, glabrous in lower part, glandular above, 10(15–20) cm long in fruit, many-flowered. Bracts small, linear-lanceolate, 2–2.5 mm long, 1/2 as long as pedicels. Pedicels erect, slender, incurved; lower pedicels slightly longer, 4–5 mm in fruit. Calyx 4-partite, with oblong-ovate, subacute lobes almost equaling or shorter than capsule, equaling or 1/2 as long as bracts. Corolla 4–5 mm long, pale blue (var. *turcmenica* Schlenker) or reddish, slightly exceeding calyx. Capsule almost equaling or exceeding calyx, orbicular-ovoid or obscurely emarginate, tapering into short or long point, 3–4.5 mm long, 2–3.5 mm broad, glabrous; style shorter than or equaling capsule. Seeds about 0.5 mm long, elliptical, somewhat compressed, weakly asperate. Flowering and fruiting in June.

On moist slopes, in alkaline meadows.—*Caucasus*: southern Transcaucasia: *Soviet Central Asia*: Dzh.-Tarbagatai, mountainous Turkmenia (Kugitang, Kopet-Dag). Pamir-Alai, Tien Shan (Kungei Ala-Tau, Susamyr Range). *General distribution*: Iran. Described from Iran. Type in Geneva.

Section 9. *Macrostemon* Boriss. sect. nov. in Addenda XXI, 809.—Sect. *Veronicastrum* Benth. in DC. Prodr. X (1846) 479 and auct. plur. p.p.—Sect. *Chamaedrys* Stroh in Beih. Bot. Centralbl. LXI (1942) 386, p.p. non Griseb.—Flowers in dense, capitate or oblong, short, spicate, terminal inflorescence. Pedicels short or flowers subsessile. Calyx 5-partite. Corolla tube short. Capsule slightly compressed, obtuse or obscurely emarginate. Seeds flat or plano-convex, orbicular or elliptical. Leaves opposite, upper leaves sometimes alternate, connivent, sessile or



short-petiolate at flowering stage. Perennials, small herbs or semishrubs, sometimes forming dense turf.

Series 1. *Alpinae* Boiss.—Stems with scale leaves in lower part. Perennial, small, high-altitude herbs. Leaves ovate to oblong, entire or serrulate, spaced. Corolla tube short. Racemes terminal, capitate or elongated, 5–20-flowered, often lax in fruit. Capsules ovoid, somewhat emarginate. Seeds flat.

123. *V. alpina* L. Sp. pl. (1753) 11; C. Koch, Monogr. Veron. 30; Benth. in DC. Prodr. X, 482; Ldb. Fl. Ross. III, 248, p.p.; Pflanzenfam. IV, 3b, 86; Römpf in Fedde, Repert. Beih. L, 29; Stroh in Beih. Bot. Centralbl. LXI, I, 386.—*V. nutans* Bong. in Mém. Acad. Pétersb. II (1833) 157.— *Ic.*: Fedtsch. and Fler. Fl. Evrop. Ross. fig. 802; Juel in Acta Horti Berg. I, No. 5, tab. I, f. 4; tab. 2, f. 15; Hegi, Illustr. Fl. Mittel-Eur. VI, 1, tab. 239, f. 2; Javorka és Csapody, Iconogr. fl. Hung., f. 3317.—*Exs.*: Fl. gall. and germ. No. 2721.

Perennial. Rootstock creeping, slender, fusiform. Plant crispate-hairy, eglandular. Stem 5–15(25) cm tall, ascending, with creeping, short, slender aerial leafy shoots, sparsely covered with long, soft, patent hairs. Upper leaves alternate, rest opposite, ovate or oblong-elliptical, 10–30 mm long, 5–20 mm broad, with short and broad petioles, acute; lower leaves obtuse, cuneate at base; all leaves ciliate along margin, subcrenate or entire; lower leaves scalelike; upper leaves gradually transforming into floral leaves. Inflorescence capitate, later elongated, hispid, with patent hairs; flowers (1)3–20 on about 1.5–2 mm long pedicels, crowded in leaf axils in terminal racemes; racemes sometimes lateral. Calyx about 3 mm long, incised upto 3/4 into 5 (one of these underdeveloped) oblong, obtuse or acute unequal lobes, pubescent with ciliate margin. Corolla sky-blue or bluish violet, sometimes white, 4–7 mm long, with obovate, unequal, obtuse lobes, corolla tube 1/3, 5-veined, glabrous inside. Stamens very short, included, scarcely exceeding tube. Pistil shorter than corolla. Capsule obovate or oblong-obovate, 4.5–7.5 mm long, 3.5–5.5 mm broad, with shallow acute sinus, pubescent; style 1/7–1/3 of capsule, erect, short. Seeds flat, smooth, elliptical, 0.7–1 mm long. June to July.

On grassy slopes, moist rocks, on hills; rarely in mountains in alpine and subalpine meadows in forest zone. *Arctic Region*: Arctic Europe; *European USSR*: Karelia-Lapland, Dvina-Pechora, Upper Dniester; *Western Siberia*: Ob' Region; *Eastern Siberia*: Angara-Sayan. *General distribution*: Arctic, Northern, Central and Atlantic Europe, China (Manchuria), Korea, Bering Strait. Described from Alps of Western Europe. Type in London.

124. *V. bellidioides* L. Sp. pl. (1753) 11; C. Koch, Monogr. Veron. 34; Benth. in DC. Prodr. X, 482; Boiss. Fl. or. IV, 452; Pflanzenfam. IV,

3b, 86; Römpf in Fedde. Repert. Beih. L, 30; Stroh in Beih. Bot. Centralbl. LXI, 387.—*V. lilacina* Towns in Bull. Soc. Bot. Fl. XXV (1878) 16.—*lc.*: Rchb. Ic. fl. Germ. XX, tab. 95, 1716, f. IV–V; tab. 214, 1835, f. 10, 11; Hegi, Illustr. Fl. Mittel-Eur. VI, 1, fig. 28; Javorka és Csapody, Iconogr. fl. Hung. f. 3318; Juel in Acta Horti Berg. I, No. 5, tab. II, f. 12;—*Exs.*: Schultz, Herb. Norm. No. 1636; Hayek, Fl. Stir. exs. No. 1245.

483

Perennial. Plant caespitose, prostrate, rooting and partially ascending. Stem 5–25 cm long, unbranched, sparsely pubescent in lower part, glandular above. Leaves all densely pubescent; lower leaves crowded, obovate, spatulate, 1.5–3.5 cm long, short-petiolate or sessile, with cuneate base, obtuse, subcrenate or subentire; cauline leaves opposite, smaller, oblong to oblong-spatulate, 1–2 pairs. Flowers 5–10, crowded in capitate, umbellate-racemose, terminal inflorescence. Pedicels erect, equaling or slightly exceeding calyx, shorter than bracts. Calyx lobes 4, sometimes 5, glandular, unequal oblong or oblong-lanceolate, subobtuse, pubescent, 1/2 as long as mature capsule. Corolla blue, exceeding calyx; limb with 4 subobtuse lobes, 3 broadly ovate, 1 ovate; tube short, with 5 veins at base. Stamens included. Capsule almost 2 times as long as calyx, about 8 mm long, 5–6 mm broad, ovoid, slightly tapering above and somewhat emarginate, glandular; style almost 1/2 as long as mature capsule. Seeds numerous, about 1 mm broad, flat, orbicular or elliptical, smooth. July to August.

In mountains, up to 3000 m, on grassy slopes and in alpine meadows. *European USSR*: Upper Dniester. *General distribution*: Atlantic and Central Europe (Alps), Balkan States-Asia Minor (mountains in northern part of Balkan Peninsula). Described from Switzerland. Type in London.

Series 2. *Fruticulosae*.—Small semishrubs, woody at base. Leaves oblong to lanceolate. Racemes short, few-flowered, lax, elongated in fruit. Capsule ovoid to oblong; style short, erect.

125. *V. fruticulosa* L. Sp. pl. (1762) 15; C. Koch, Monogr. Veron. 35; Benth. in DC. Prodr. X, 480; Ldb. Fl. Ross. III, 247; Pflanzenfam. IV, 3b, 85; Römpf in Fedde, Repert. Beih. L, 32; Stroh in Beih. Bot. Centralbl. LXI, 388.—*lc.*: Rchb. Ic. fl. germ. XX, tab. 96, 1717, f. III; tab. 214, 1835, f. 9; Juel in Acta Horti Berg. I, No. 5, f. 13; Hegi, Illustr. Fl. Mittel-Eur. VI, 1, tab. 238, f. 4.

Perennial. Stems woody at base, 10–30 cm tall, erect or partially ascending, branched above, numerous, puberulent or subglabrous. Leaves opposite, short-petiolate, oblong or lanceolate, 1–2.5 cm long, 0.3–0.7 cm broad, tapering above, subobtuse, appressed-pilose or subglabrous, shining, somewhat thick, obscurely dentate, lower leaves small. Flowers (up to 15) in lax racemes. Pedicels short, alternate, glandular-pilose slightly shorter than bracts and calyx, nearly as long

484 in fruit. Calyx lobes lanceolate, generally shorter than capsule, rounded above, glandular. Bracts and pedicels glandular. Corolla 10–13 mm across, pale pink or red, with dark stripes, rarely white, with yellow throat, short tube; limb with 1 orbicular-truncate, 2 orbicular-ovate and 1 ovate lobes. Stamens almost equaling corolla. Capsule 5–7 mm long, 4–5 mm broad, oblong-ellipsoid and ovoid, sometimes retuse, glandular-pubescent; style almost equaling capsule, curved. Seeds 15–30 in locule, about 1.5 mm long, elliptical or oblong, almost smooth. July to August.

On stony and pebbly mountain slopes, on rocks, often on slopes of southern exposure. *European USSR*: Upper Dniester. *General distribution*: Atlantic and Central Europe. Described from Spain. Type in London.

126. *V. fruticans* Jacq. Enum. stirp. Vindob. 2 (1762) 200; Pflanzenfam. IV, 3b, 85; Stroh in Beih. Bot. Centralbl. LXI, 388.—*V. saxatilis* L. f. Suppl. (1780) 83; C. Koch, Monogr. Veron. 35.— *Ic.*: Rchb. Ic. fl. Germ. XX, tab. 96, 1717, f. I–II; tab. 214, 1835. f. 8; Hegi, Illustr. Fl. Mittel-Eur. VI, tab. 239, f. 3; Javorka è Csapody, Iconogr. fl. Hung. f. 3319; Juel in Acta Horti Berg. I, No. 5, tab. I, fig. 8—tab. II, fig. 14.—*Exs.*: Fl. Stir. exs. No. 661.

Perennial. Semishrub. 5–10 cm tall, pubescent with appressed, short and crispate hairs, intermixed with patent hairs or glabrous. Stem branched, densely leafy, erect, ascending or partially ascending. Leaves oblong-lanceolate or elliptical, 1–2 cm long, 0.2–0.6 cm broad, obtuse, obscurely crenate or subentire, with cuneate base, generally glabrous and shining, somewhat thick; lower leaves petiolate, upper sessile, gradually transforming into bracts. Racemes terminal, lax, pubescent with crispate and glandular hairs; racemes rarely lateral. Flowers (1–18) in axils of lower, leaflike bracts. Pedicels erect, generally longer than bracts. Calyx lobes 4, spatulate, oblong to lanceolate, sometimes with 5th underdeveloped lobe, finely ciliolate. Corolla 10–14 mm across, dark blue, with purple throat, sometimes pink, with very short tube, 5-veined; limb rotate, with 3 subequal, orbicular and 1 larger, orbicular-reniform, lobes. Stamens included, with curved filaments and ovoid anthers. Capsule oblong-lanceolate, 7–9 mm long, 3–5 mm broad, tapering above, equaling calyx or 2 times as long, not emarginate, dehiscing into 4 parts along valves and placental column; style 1/2 as long as or almost equaling capsule. Seeds numerous, oblong-ovate, minute. June to August.

In damp meadows, in mountains along rocks, debris and in meadows of alpine and subalpine zones.—*Arctic Region*: Arctic Europe: *European USSR*: Karelia-Lapland, Upper Dniester (Carpathian mountains). *General*  
485 *distribution*: Arctic Region, Scandinavia, in mountains of Central and



Atlantic Europe, Mediterranean Region (mountains). Described from Western Europe. Type in Vienna.

Series 3. *Diffusae* Boriss.—Short, high-altitude herbs, becoming woody at base, often caespitose. Leaves orbicular to ovate, generally crowded. Racemes capitate, sometimes spicate in fruit. Bracts shorter than calyx. Corolla tube short. Capsule suborbicular or oblong-obovoid, shallow-emarginate.

127. *V. lütkeana* Rupr. in Mém. Acad. Sc. Pétersb. 7, XIV, 4 (1869) 62; Stroh in Beih. Bot. Centralbl. LXI, 423.—*V. macrostemon* auct. fl. As. Med. non Bge.—*V. capitata* Royle var. *tomentosa* Schmidt in Journ. Bot. 6 (1868) 229, 247.

Perennial. Roots slender, numerous. Plant 5–6(10) cm tall, sparsely caespitose. Stem branched in middle, with short lateral shoots, uniformly pubescent throughout. Leaves ovate or orbicular, upto 13 mm long, 8–11 mm broad, generally acute densely canescent on both surfaces; upper leaves serrate. Flowers in corymbose, generally compact inflorescence, almost spicate in fruit, elongated upto 2.5 cm. Pedicels of lower flowers 5–8 mm long. Calyx lobes 5, unequal, narrowly lanceolate, densely crispate-hairy; 1 lobe much shorter than others. Corolla blue or bluish violet, about 6 mm long, with almost regular limb and very short tube. Stamens shorter than, equaling or slightly exceeding corolla; anthers about 1 mm long, orbicular. Capsule about 5 mm long, 3–3.5 mm broad, slightly exceeding calyx, ovoid, not emarginate, subobtuse, with diffuse long hairs, generally above; style almost equaling capsule, slender. Seeds flat, ovate, about 1 mm long, 0.75 mm broad, inserted at base, brown. Flowering May to July. Fruiting July to August (Plate XXII, fig. 1).

In alpine zone near snow banks and glaciers, in moist soils at 1700–3700 m altitude.—*Soviet Central Asia*: Pamiro-Alai, Tien Shan. *General distribution*: Dzh.-Kashgar (Kuldzha). Described from Kungei Ala-Tau Range, Dzhaman-Daban Ravine. Type in Leningrad.

128. *V. macrostemon* Bge. in Ldb. Fl. alt. I (1829) 35; C. Koch, Monogr. Veron. 35; Benth. in DC. Prodr. X, 479; Ldb. Fl. Ross. III, 246; Pflanzenfam. IV, 3b, 85; Kryl. Fl. Zap. Sib. X, 2447; Römpf in Fedde, Repert. Beih. L, 41; Stroh in Beih. Bot. Centralbl. LXI 389.—*Ic.*: Ldb. Ic. pl. fl. Ross. I, tab. 127.

Perennial. Rootstock slender, creeping; roots numerous, slender. Stems generally numerous, somewhat spaced, 10–15(30) cm tall, procumbent, with long spreading branches in middle, uniformly pubescent above, subglabrous below. Lower leaves scale-like, spaced, suborbicular or ovate, subentire; cauline leaves 5–15 mm long, 3–10 mm broad, oblong-elliptical or ovate, serrate-dentate, subacute, subsessile or narrowed into very short



petiole, somewhat spaced, scattered hairy above, glabrous or subglabrous beneath. Flowers in terminal, subcapitate and oblong racemes, elongated into spicate inflorescence towards end of flowering stage. Bracts oblong-lanceolate, acute, sparsely crispate-hairy. Pedicels equaling calyx, shorter than bracts. Calyx lobes lanceolate, subacute, pilose mainly along margin. Corolla bluish violet, 2 times as long as calyx, 7–9 mm long. Stamens and Style exerted by 2–2.5 mm; anthers about 1 mm long. Capsule oblong-obovoid, 5–6 mm long, 1.5 times as long as calyx, shallowly emarginate, slightly laterally compressed. Style filiform, included. Seeds flat, ovate, about 1.5 mm long, 1 mm broad, inserted at base. June to August.

On rocks and grassy slopes in pebbly-lichen tundra in alpine zone.—*Western Siberia*: Altai Mountains: *Eastern Siberia*: Angara-Sayan. *General distribution*: Mongolia. Described from vicinity of Chuya River. Type in Leningrad.

129. *V. densiflora* Ldb. Fl. alt. I (1829) 34; C. Koch, Monogr. Veron. 35; Benth. in DC. Prodr. X, 480; Ldb. Fl. Ross. III, 246; Römpf in Fedde, Repert. Beih. L, 41; Kryl. Fl. Zap. Sib. X, 2448; Stroh in Beih. Bot. Centralbl. LXI, 389.—*V. capitata* Fisch. ex Colla, Herb. Pedem. IV (1835) 348, non Royle; Stroh, l.c. 432.—*V. alpina* Pall. ex Koch, l.c. 35.—*Paederota humilis* Stephan ex Link. Jahrb. I, III (1820) 45.—*P. bonarota* Schangin in Pall. Neue nord. Beiträg. VI (1812) 55, non L.; Georgi. Besch. Russ. Reich. Beih. III, 4, 653.—*l.c.*: Ldb. Ic. pl. fl. Ross. II, tab. 125; Juel in Acta Horti Berg. I, No. 5, tab. I, f. 11; tab. II, f. 16.

Perennial. Rootstock slender. Densely caespitose plant. Stems 5–15 cm tall, numerous, branched at base, ascending, with 2 opposite rows of hairs alternating along internodes, sometimes evenly extending only along upper part of stems. Leaves opposite, connivent at flowering stage, separating at fruiting stage, sessile; lower leaves sometimes connate at base, lower-most scalelike, small; stem uniformly leafy up to inflorescence, leaves oblong or obovate to orbicular-ovate, 7–20 mm long, 5–12 mm broad, subobtusate, crenulate or crenate, narrowed and entire toward base, sparsely pubescent on both surfaces, rather thin. Flowers in terminal, compact, rounded or oblong racemes, later elongated in fruit. Pedicels almost equaling calyx, pubescent, shorter than bracts. Calyx 3–3.5 mm long; lobes 5, ovate-lanceolate, with ciliate margin; 1 lobe much smaller than others. Corolla deep sky-blue or lilac, 6–7 mm long, limb subregular, with 3 oblong, subobtusate, erect lobes and 1 ovate, obtuse lobe; tube 1/2 as long as limb, with hairy ring in throat. Stamens and pistil exerted. Capsule about 4 mm long, obovoid, slightly laterally compressed, with or without small sinus, 1.5 times as long as calyx, glabrous, sometimes

with scattered hairs; style filiform, much exceeding corolla. Seeds plano-convex, about 1 mm broad, ovate. Flowering May to June. Fruiting May to August (Plate XXII, fig. 4).

On pebbly and stony slopes, from forest to alpine zones, on barren peaks in lichenaceous tundra, near edges of snow patches. *Western Siberia*: Irtysh, Altai Mountains (Kuznetsk Ala-Tau); *Eastern Siberia*: Angara Sayan, Dauria; *Soviet Far East*: Kamchatka; *Soviet Central Asia*: Dzh.-Tarbagatai, (Saur), Tien Shan (Terskei Ala-Tau). *General distribution*: Mongolia. Described from Koksu River. Type in Leningrad.

130. *V. macrostemonoides* Zak. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSR, XIII (1950) 44.—*V. macrostemon* auct. fl. As. Med. non Bge.

Perennial. Roots numerous, slender. Plant 12–20(25) cm tall, crispate-hairy. Stem simple or branched, often violet, partially ascending, flexuous, uniformly hairy or subglabrous. Leaves opposite, ovate or oblong-ovate, sometimes suborbicular, 8–15(20) cm long, 6–12 mm broad, sessile, with rounded base, subacute, rarely denticulate or entire, crispate-hairy or subglabrous (var. *hissarica* Boriss.); lower leaves scalelike, oblong, spaced. Flowers on terminal, corymbose-capitate racemes, elongated in fruit. Bracts lanceolate, almost equaling pedicels at flowering stage. Pedicels 4–6 mm long, 7–10 mm in fruit. Calyx lobes 5, lanceolate 3–4 mm long, 1–1.5 mm broad, crispate white-hairy or sparsely pilose. Corolla sky-blue or blue (var. *hissarica* Boriss.), tube about 1 mm long, limb 5–6 mm across. Stamens slightly exserted, about 5 mm long, anthers ovoid, about 1 mm long. Capsule about 4 mm long, with isolated white hairs, subacute. Seeds not known. July to August.

On stony slopes and among debris.—*Soviet Central Asia*: Pamiro-Alai (Zeravshan and Hissar ranges). Endemic. Described from Zeravshan Range. Type in Leningrad.

488 *Note*. Plants from the Hissar Range are distinguished from typical plants by the glabrous or subglabrous leaves, longer pedicels, smaller calyx with less pubescent lobes and blue flowers (var. *hissarica* Boriss.).

131. *V. serpylloides* Rgl. in Tr. Peterb. bot. sada. VI, 2 (1879) 345; Stroh in Beih. Bot. Centralbl. LXI, 389; Pavlov in Vestn. Akad. Nauk KazSSR, 6, 43.

Perennial. Roots numerous, slender. Stem pubescent above, with 2 opposite rows of hairs, branched from base, densely leafy. Leaves fleshy, somewhat stiff, orbicular-ovate or elliptical, 5–8 mm long, obtuse, subobtuse or subacute, narrowed toward base; with margin crispate, sparsely shallowly crenate or entire; young leaves sparsely hairy, later subglabrous. Flowers in terminal compact racemes or sometimes in lateral racemes. Pedicels much shorter than calyx, both villous with white

crispate hairs. Calyx lobes lanceolate. Corolla whitish or bluish, subrotate, glabrous inside; limb subregular, tube very short. Stamens slightly exserted; style slender, long, exserted. Capsule suborbicular, scarcely emarginate. Flowering July.

In alpine zone.—*Soviet Central Asia*: Dzh.-Tarbagatai. Endemic: Described from Kazan Pass near Sairam Lake, in valley of Kaskabulak River. Type in Leningrad.

Section 10. *Stenocarpon* Boriss. sect. nova. in Addenda XXI, 809.—Flowers in dense, terminal, corymbose or capitate racemes, subsessile. Calyx 5-partite. Corolla tube short. Style often short and erect. Capsules not compressed, longer than broad, tapering above, subacute, dehiscent into 4 parts. Seeds minute, ovoid, narrowed toward base, obtuse. Perennial high-altitude herbs. Leaves ovate to lanceolate, acute, sessile, spaced.

Series 1. *Tianschanicae* Boriss.—Caespitose plants. Stems with scale leaves in lower part. Leaves glabrous, obscurely dentate or entire; upper leaves alternate, lower opposite, ovate-oblong. Corolla greenish white. Capsules ovoid.

132. *V. tianschanica* Lincz. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, VII, 5 (1938) 107: Pavlov in Vestn. Akad. Nauk KazSSR, 6, 43.—*lc.*: Lincz. l.c. fig. 1.

Perennial. Rhizomatous plant, 10–20 cm tall, densely caespitose. Stems numerous, up to 40, partially ascending at base, generally simple or weakly branched at base, with scale leaves below, glabrous or diffusely puberulent, densely leafy. Leaves sessile, glabrous, smooth, entire or obscurely dentate, somewhat thick, lower leaves opposite, ovate to oblong-lanceolate, subacute, 5–10(15) mm long, 5–9 mm broad; upper leaves alternate; rarely opposite, oblong to oblong-lanceolate, 5–7 mm long, 1.5–2.5 mm broad. Flowers 10–15, in dense, spicate or capitate, terminal racemes, sometimes in corymbose inflorescence; inflorescence 15–30 mm long, about 15 mm in diameter, elongated in fruit; axis puberulent. Bracts herbaceous, green, oblong-lanceolate, 6–8 mm long, 2–2.5 mm broad, short-ciliate along margin. Pedicels 2–3 mm long. Calyx with 5 unequal, narrow lanceolate, (1.5)2.5–3(4) mm long, puberulent lobes with ciliate margin. Corolla greenish white, 4-partite, lobes 5–6 mm long, 1–2.5 mm broad, oblong-ovate or oblong, with short-ciliate margin, subacute; tube very short. Stamens 2 (sometimes 4), slightly exserted; anthers about 1 mm long. Ovary about 1 mm long, orbicular, pointed; style suberect, 7–8 mm long. Capsule (immature) ellipsoid, 4–5 mm long, puberulent. Seeds not known. June to July.

In mixed-grass meadows on thin-soiled pebbly slopes of subalpine and alpine zones.—*Soviet Central Asia*: Tien Shan. Endemic. Described from Talas Ala-Tau. Type in Leningrad.



Series 2. *Pamiroalaicae* Boriss.—Stems without scale leaves in lower part. Leaves oblong or oblong-ovate, not appressed to stem. Bracts shorter than flowers. Corolla tube very short. Stamens almost equaling corolla. Capsule ellipsoid, not emarginate, slightly compressed; style long.

133. *V. gorbunovii* Gontsch. in Tr. Tadzh. bazy, II (1936) 179.

Perennial. Roots fibrous. Plant (12)20–35 cm tall. Stems 6–13, sometimes more, simple, partially ascending at base, cylindrical, pubescent, later subglabrous below, leafy. Leaves opposite, sometimes in whorls of 3, uppermost sometimes alternate, generally almost equaling or shorter than internodes, oblong-ovate; upper leaves more elongated, all sessile, with rounded base, obscurely denticulate or subserrate, somewhat thick, glabrous, rarely with isolated, appressed white hairs, (12)15–22 mm long, 9–12(16) mm broad, gradually reduced above. Racemes terminal, 13–20 flowered, compact, oval 15–22 mm long, 9–13 mm broad, up to 25–40 mm long in fruit, axis crispate white-villous. Bracts shorter than flowers, green, lanceolate, gradually reducing above. Pedicels about 1 mm long, elongated up to 2.5 mm in fruit. Calyx lobes oblong-lanceolate, about 3.5 mm long, 0.5–0.7 mm broad, subobtus, crispate white-villous. Corolla blue, tube about 1 mm long, limb about 9 mm across; lobes unequal, ovate, obtuse; outer lobe largest, others, especially inner, smaller. Stamens almost equaling corolla; anthers about 1 mm long. Capsule ellipsoid, about 5 mm long, 3 mm broad, with rounded tip, not emarginate, slightly compressed, puberulent; style slender, curved, almost equaling capsule. Seeds about 1 mm long, oblong-ovoid, light brown. June to August (Plate XXII, fig. 3).

In subalpine meadows, at 2700–3300 m.—*Soviet Central Asia*: Pamiro-Alai (Zeravshan and Hissar ranges, Darvaz Mountains). Endemic. Described from Zeravshan Range. Type in Leningrad.

Series 3. *Ciliatae* Boriss.—Stems without scale leaves. Leaves pubescent, generally opposite. Corolla blue, pink or whitish blue. Capsules tapering above, with short, erect styles.

134. *V. ciliata* Fisch. in Mém. Soc. Nat. Mosc. III (1812) 56; Benth. in DC. prodr. X, 467; Ldb. Fl. Ross. III, 240, Hook. Fl. Brit. Ind. IV, 292; Römpf in Fedde, Repert. Beih. L, 163; Stroh in Beih. Bot. Centralbl. LXI, 430.—*V. alpina* auct. non L. Georgi, Reise, I (1800) 195; O. and B. Fedtsch. Perech. rast. Turkest. 5, 91 p.p.—*V. macrocarpa* Turcz. Fl. exs. ex Steud. Nom. II (1843) 758, non Vahl.

Perennial. Roots fibrous. Stems with two rows of hairs, erect, partially ascending at base, branched, 14–30 cm tall, hard, cylindrical. Leaves opposite, lower short-petiolate, upper sessile, erect, ovate or oblong-lanceolate,



obtuse, 2–2.5 cm long, shorter than internodes, entire at tip and base, unequally serrate-crenate in middle part of lamina, hairy especially along margin and veins beneath; upper leaves subglabrous. Flowers 4–12, in capitate, pubescent, terminal inflorescence. Bracts linear, ciliate. Pedicels short, pilose, slightly shorter than bracts, elongated in fruit. Calyx 5-partite, 5th lobe generally  $\frac{1}{3}$  as long as corolla and much smaller than others; latter erect, oblong-lanceolate, obtuse, ciliate and pilose. Corolla 5–6 mm across, sky-blue, bluish violet or pink, tube short; limb with 3 subequal, orbicular, broadly emarginate, and 1 oblong-lanceolate, scarcely emarginate lobes; lobes sometimes 5–6. Stamens  $\frac{1}{2}$  as long as corolla lobes, slightly curved, glabrous; anthers suborbicular-reniform. Capsule 9–10 mm long, 1.5–3 times as long as calyx, tapering above and sub-  
 491 obtuse, scarcely emarginate, pubescent with long hairs, with short erect style. Seeds flat, 0.5–0.75 mm long, 0.25–0.5 mm broad. Flowering June to August (Plate XXII, fig. 2).

In high-altitude zone, in gravelly moist soils of alpine meadows, on stony banks of rivers and lakes at altitude up to 3600 m.—*Eastern Siberia*: Angara-Sayan, Dauria; *Soviet Central Asia*: Dzh.-Tarbagatai, Pamiro-Alai, Tien Shan (Trans-Ili Ala-Tau). *General Distribution*: India-Himalayas, Dzh.-Kashgar, Mongolia, China, Tibet. Described from Trans-Baikal Region. Type in Elningrad.

Series 4. *Longibracteatae* Boriss.—Stems without scale leaves. Leaves acuminate, broadest in lower part, appressed to stem. Bracts much exceeding calyx and corolla, young inflorescence as a result appearing tufted. Corolla united up to  $\frac{1}{2}$ . Stamens included. Capsule subacute, tapering above; style short.

135. *V. fedtschenkoi* Boriss. sp. nov. Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XVII (1955).—*V. ciliata* auct. Fl. As. Med. non Fisch.

Perennial. Roots fibrous. Plant with flowering and short vegetative basal shoots. Stems few, partially ascending at base, flexuous and erect, simple, unbranched, 15–25 mm tall, covered with long, curved, crispate hairs, densely so above, with 2 opposite rows of hairs below. Leaves sessile, 1.5–3 cm long, 5–10 mm broad, narrowly lanceolate; lower leaves oblong-lanceolate; uppermost linear, broadest in lower part, with rounded base, long acuminate, with reflexed margin, sparsely denticulate, with sparse, white, soft and long hairs; all leaves erect, somewhat appressed to stem. Raceme capitate or oblong, compact, tufted in bud due to long bracts; axis and pedicels pilose. Bracts acuminate, linear, pilose; lower bracts 3 times as long as calyx, often separated from upper. Pedicels 1 mm long or flowers subsessile. Calyx with 5 unequal, pointed, linear lobes—one 5 mm long, two 4 mm long and one 1.5 mm long; calyx pubescent throughout with long, white, sinuate, non-articulate hairs. Corolla blue, 6–7 mm

long, almost 1/2 united into 1.5–2 mm broad tube, glabrous in throat; limb with 4 unequal, acute lobes; 1 lobe orbicular-ovate, 2–2.5(3) mm broad, sometimes emarginate, 2 oblong, 1.5–2 mm broad, and 1 lanceolate, about 1 mm broad. Stamens included, inserted in throat; anthers ovoid, subacute, about 1 mm long. Style 2–3 mm long, included. Capsule ovoid, about 3.5 mm long, about 2 mm broad, slightly tapering above, subacute, sparsely hairy. Seeds ovoid, about 1 mm long, 0.5 mm broad, obtuse above, acute at base, slightly angular, 6 in locule. Flowering June to July. Fruiting August.

- 492 On grassy slopes in alpine zone.—*Soviet Central Asia*: Pamiro-Alai (Alai and Trans-Alai ranges), Tien Shan (Susamyr Range). Endemic. Described from Trans-Alai Range. Type in Leningrad.

*Note.* Similar to *V. gorbunovii* Gontsch., from which it is distinguished by the narrow, long-acuminate, hairy leaves, broad at base; the bracts exceeding the flowers; the calyx with linear lobes; the corolla with 2–3 mm long tube and acute lobes; and by the capsules. It is distinguished from *V. ciliata* by the shape and length of leaves, bracts, and pedicels; the shape of the calyx lobes; the capsules; and by the length of the style.

Subgenus II. *PAEDEROTELLA* (Wulff) Boriss. comb. nov.—Section *Paederotella* Wulff in Tr. Tifl. bot. sada, XV (1915) 68; Vestn. Tifl. bot. sada, 28, 1, nomen;—Sect. *Paederota* Wettst. in Pflanzenfam. IV, 3b (1895) 85.—Genus *Paederotella* (Wulff) Kem.-Nath. in Fl. Gruz. Akad. Nauk VII (1952) 341; Zam po sist. i geogr. rast. Akad. Nauk GruzSSR, 17 (1953) 21.—Flowers solitary in axils of cauline leaves. Pedicels 10–15 mm long. Calyx 5-partite almost to base. Corolla campanulate-tubular, 4-partite almost up to base, without hairy ring inside, yellow, with very short broad tube. Stamens not hairy near insertion place. Capsule hard, not compressed, acute, laterally inflated, dehiscing by valves. Seeds minute, plano-convex. Leaves opposite, lower scalelike, brown. Perennial bushy plants with extremely woody rootstock.

136. *V. ruprechtii* Lipsky, Fl. Kavk. Dopoln. I (1902) 73.—*Paederota pontica* Rupr. ex Boiss. Fl. or. IV (1879) 434.—*V. pontica* (Rupr.) Wettst. in Pflanzenfam. IV, 3b (1895) 85, non velenovsky, nec Hausskn. ex Bornm. in sched; Wulff in Tr. Tifl. bot. sada, XV, 68; Grossh. Fl. Kavk. III, 382; Stroh in Beih. Bot. Centralbl. LXI, 431.—*Paederotella pontica* (Rupr.) Kem.-Nath. in Zam. po sist. i geogr. rast. Akad. Nauk GruzSSR, 17 (1953) 22.—*lc.*: Vestn. Tifl. bot. sada, 28, fig. 1; Fl. Gruz. VII, fig. 344.—*Exs.*: GRF, No. 1032.

Perennial. Rootstock reduced, woody. Plant 10–30 cm tall, glabrous or puberulent. Stem simple or branched, slender, hard, cylindrical, glabrous or crispate-puberulent, with yellowish brown scale leaves at base. Cauline leaves ovate to oblong-lanceolate, obtuse or acute, regularly crenate

in middle, with rounded base, short-petiolate. Flowers 9–13 mm long, solitary in axils of similar opposite cauline leaves, on pedicels almost equaling calyx, curved in fruit. Calyx lobes lanceolate or linear-lanceolate, obtuse or acute, curved in fruit. Corolla yellow, 2–3 times as long as calyx, incised almost to base, with broad, short tube and obovate, obtuse, erect lobes. Pistil with long style gradually narrowed toward base, exceeding corolla; stigma deeply emarginate, bipartite, cordate. Capsule 5–6 mm long, inflated, broadly ovoid, gradually tapering above, glabrous or sparsely pubescent. Seeds minute, plano-convex. May to June.

In meadows, forest ravines, rock fissures, in subalpine and middle mountain zones.—*Caucasus*: western Transcaucasia, Endemic. Described from Adzharo-Imeretinsk Range. Type in Leningrad.

Note. *V. pontica* var. *glabra* (Somm. and Lev.) Stroh [= *Paederota pontica* var. *glabra* Somm. and Lev. in Tr. Peterb. bot. sada, XIV (1900) 370] is recognized.

137. *V. teberdensis* (Kem.-Nath.) Boriss. comb. nov.—*Paederotella teberdensis* Kem.-Nath. in Zam. po sist. i geogr. rast. Akad. Nauk GruzSSR, 17 (1953) 22; Fl. Gruz. VII, 542.—*Idem*: Fl. Gruz. VII, fig. 345.

Perennial. Rootstock short, woody. Plant crispate-puberulent or glabrous, 10–30 cm tall, multicaulis. Stems slender, hard, cylindrical, simple, rarely branched, with brown scale leaves at base. Cauline leaves opposite, glabrous or sparsely pubescent, slightly coriaceous, short-petiolate or subsessile, long tapering and acute, or lower leaves obtuse, oblong-ovate, or upper leaves lanceolate, regularly sharply dentate or entire. Flowers in axils of similar cauline leaves, solitary, 12–15 mm long. Pedicels slender, 10–12 mm long, almost equaling calyx lobes. Calyx lobes dissimilar, acuminate, glabrous or with ciliate margin, recurved in fruit. Corolla 12–15 mm long, incised almost up to base, with very short and broad tube, lobes almost similar, obovate, subacute. Stamens almost equaling corolla. Style exserted, stigma clavate, weakly emarginate, sharply transforming into style. Capsule short-ovoid, with inflated loculae, sharply tapering, pointed, about 4 mm long, 4–5 mm broad. Seeds minute, plano-convex, with distinct hilum. May to July.

On rocks, shale and limestone outcrops, in wooded ravines, in subalpine and middle-mountain zones.—*Caucasus*: Ciscaucasia, western Transcaucasia (western part of Main Range). Endemic. Described from vicinity of Teberda. Type in Tbilisi.

138. *V. daghestanica* Trautv. in Tr. Petersburg. bot. sada, X (1887) 124; Wulff in Tr. Tifl. bot. sada, XV, 70; Grossh. Fl. Kavk. III, 382; Stroh in Beih. Bot. Centralbl. LXI, 431.



494 Perennial. Plant caespitose, puberulent, with slender, branched, hy-pogaeal reduced stem. Year-old stems short, slender, erect or partially ascending, simple, up to 6 cm tall, with scale leaves at base. Leaves with 1 mm long petioles, lamina broadly ovate, up to 1 cm long, cuneate or rounded at base, acute, sparse unequally dentate in middle; floral-leaves smaller, oblong-lanceolate, entire. Flowers 1–5, solitary in axils of upper floral leaves, pedicels erect, lower upto 1.5 cm long, 2–3 times as long as leaves and calyx in fruit. Calyx up to 5 mm long, 5-partite, glandular-pubescent, with acute lobes. Corolla with 5 lobes, 4 subequal and oblong, 5th linear,  $1/2$  as long as others. Capsule erect, orbicular-ovoid, slightly laterally compressed, glandular-pubescent, slightly shorter than calyx, acute, entire, 2-lobed, with ovoid lobes, dehiscent by 4 teeth at tip; style 10–11 mm long. Seeds suborbicular or elliptical, plano-convex, compressed, with small hilum at base. Flowering July. Fruiting August.

In rock fissures.—*Caucasus*: Dagestan. Endemic. Described from Dagestan. Type in Leningrad.

Subgenus III. *VERONICASTRUM* (Heister) Boriss. comb. nov.—Genus *Veronicastrum* Heister ex Febr. Enum. meth. pl. Hort. Helmstad (1759) 111.—Genus *Leptandra* (Nutt.) Gen. N. Amer. I (1817) 7.—Section *Leptandra* (Nutt.) Benth. in DC. Prodr. X (1846) 463; Stroh in Beih. Bot. Centralbl. LXI, 242 (subsect.); Pflanzenfam. IV, 3b, 85 —Flowers sessile or short-pedicellate, crowded in terminal, single, rarely divaricate, spicate racemes. Calyx often 5-partite. Corolla tube much exceeding calyx and limb; lobes erect or slightly deflected. Capsules emarginate, slightly laterally compressed or not, loculicidal, valves adnate with placental column. Seeds ovoid, not compressed, asperate. Leaves in whorl of 3–9, opposite or alternate. Perennial, tall herbs. Species of North America and Eastern Siberia.

Series 1. *Tubiflorae* Boriss.—Leaves alternate, linear, 3–7 cm long, 2–5 mm broad.

139. *V. tubiflora* Fisch. and Mey, Ind. sem. hort. Petrop. II (1835) 53; Turcz. Fl. baic.-dah. II, 338; Benth. in DC. Prodr. X, 464; Ldb. Fl. Ross. III, 229; Pflanzenfam. IV, 3b. 85; Kom. and Alis. Opred. rast. Dalnevost. kr. II, 920; Stroh in Beih. Bot. Centralbl. LXI, 432.—*V. longiflora* Roem. and Schult. Syst. veg. I (1817) 95; C. Koch, Monogr. Veron. 36.—*Paederota angustifolia* Turcz. ex Bess. in Flora, XVII (1834) I; Beibl. 21.—*P. tubiflora* Walpers in Ann. Bot. syst. 3 (1848–53) 370.—*Leptandra meyeri* G. Don, Gen. pl. 4 (1831–1838) 579.—*L. angustifolia* Lehm. Del. Sem. Hamb. (1839); Linnaea XIV (1840) 130.—*Leptandra tubiflora* Fisch. and Mey. in Ann. Sc. Nat. Sér. II, V (1836) 301; Airy-Shaw in Bot. Mag. Lond. CLXII sub tab. 9780.—*Exs.*: GRF, No. 3474.



Perennial. Stem 40–60 cm tall, erect, hard, finely sulcate. Leaves often alternate, sessile, linear, 3–7 cm long; 2–5 mm broad, acute, cunate at base, regularly, sharply serrulate, glabrous (var. *Linneaea* Kom.) or velutinous beneath with short curved hairs (var. *velutina* Kom.). Inflorescence spicate, terminal, single, 5–15 cm long, about 1.5 cm broad. Bracts filiform or linear, acuminate, exceeding corolla. Pedicels about 1 mm long, upto 2 mm in fruit, sparsely pubescent. Calyx about 2 mm long, parted almost up to base into 5 ovate, sub-equal, acute lobes. Corolla, blue, about 7 mm long, tube long much exceeding limb and calyx; limb about 2 mm long, with 4 erect, oblong lobes. Stamens exerted almost by 2 mm. Capsule ovoid, about 2–2.5 mm long, acute, bilocular, dehiscing by 4 teeth; style exceeding stamens, persistent in fruit. Seeds about 0.5 mm long, 0.3 mm broad, ovate, obtuse, with asperate surface. June to July (Plate XXIII. fig. 1).

In flood-plain meadows, among shrubs, on banks of lakes and rivers. *Eastern Siberia*: Dauria; *Soviet Far East*: Zeya-Bureya, Ussuri. *General distribution*: China (Manchuria). Described from Trans-Baikal Region. Type in Leningrad.

Series 2. *Sibiricae* Boriss.—Leaves opposite or in whorls of 3–9, oblong-lanceolate to broadly ovate, 4–20 cm long, 2–4 cm broad.

In addition to species described below, this series includes the American species *V. virginica* Forbs and Hemsl.

140. *V. sibirica* L. Sp. pl. (1762) 12; Benth in DC. Prodr. X. 464; Ldb. Fl. Ross, III, 229; Kom. and Alis Opred. rast. Dalnevost. kr. II, 920; Stroh in Beih. Bot. Centralbl. LXI, 432.—*V. sibirica* Gmel. ex Koch, Monogr. Veron. (1833) 36.—*V. japonica* Sieb. and Zucc. in Steud. Nomencl. 2 (1843) 143, p.p.—*V. virginica* auct. non L.; Wettst. in Pflanzenfam. IV, 3b. (1895) 85, p.p.; Sugawara, Illustr. Fl. Saghal. 276, p.p.;—*V. virginica* var. *sibirica* (L.) Nakai in Tokyo Bot. Mag. XXVI (1912) 170.—*Paederota sibirica* Walpers, Repert. bot. III (1844–1845) 365.—*Leptandra sibirica* (L.) Nuttall ex G. Don, Gen. syst. IV (1837) 579.—*Calistachya sibirica* Rafin. in Med. Repos. V (1808) 60, p.p.—*Eustachya coerulea* Rafin. in Ann. Gen. Sc. Phys. VI (1820) 97.—*Veronicastrum sibiricum* (L.) Hara in Journ. Jap. Bot. XVI (1940) 159.—*lc.*: Kom. and Alis. l.c. Plate 275.—*Exs.*: GRF, No. 1128.

Perennial. Stem 40–150 cm tall, stout, cylindrical, sulcate, glabrous or pubescent. Leaves in whorls of 3–9, oblong-lanceolate or oblong, 496 4–12 cm long, 2–4 cm broad, acuminate, narrowly cuneate at base, sessile patently sharply serrate, glabrous or sparsely puberulent. Flowers sessile or subsessile, numerous, crowded in terminal, spicate, up to 30 cm long inflorescence; inflorescence often single, sometimes a few together. Bracts linear, pointed, exceeding calyx. Calyx about 4 mm long, with 5 unequal—2 linear and 3 lanceolate-linear—lobes, ciliate along margin.

Corolla 7–8 mm long, violet, rarely pink or white, tube pilose inside, much exceeding limb and calyx, 5-veined; limb with 4 unequal lobes, the broadest orbicular, about 2 mm long rest narrower; all lobes pilose inside. Stamens erect, about 12 mm long; filaments pilose in lower part; anthers bilocular, about 1 mm long, oblong. Capsule ovoid or oblong, tapering above, subobtuse, bilocular, 2.5–3 mm long; style filiform, about 5 mm long, 1.5–2 times as long as capsule. Seeds about 0.3 mm long, 0.25 mm broad, ovate, finely sulcate. Flowering from June to July. Fruiting August to September (Plate XXIII, fig. 2).

In floodplain and mountain meadows, among scrub, in broad-leaved forests.—*Eastern Siberia*: Angara-Sayan, Dauria; *Soviet Far East*: Zeya-Bureya, Uda Region, Ussuri, Endemic. Described from Siberia. Type in London.

141. *V. sachalinensis* Boriss. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XVII (1955).—*V. virginica* var *sibirica* Nakai ex Honda, Nom. Pl. Jap. (1939) 312, p.p., Sugawara, Illustr. Fl. Saghal. IV, 1633, p.p.—*lc.*: Sugawara, l.c. tab. 748.

Perennial. Stem erect, stout, glabrous or pubescent, sulcate. Plant blackening when dry. Leaves sessile, in whorls of 5–9, lanceolate, acuminate, 10–20 cm long, 2–3(4) cm broad, cuneate, sharply serrulate with upcurved serrations, glabrous above, pubescent beneath or with scattered erect hairs or glabrous. Flowers numerous, in terminal spicate 15–40 cm long inflorescence. Pedicels about 1 mm long. Bracts broadened at base, linear, long tapering. Calyx about 3.5 mm long with 5 unequal, linear, acuminate, glabrous lobes. Corolla 6 mm long, 4 unequal, 1 mm long lobes, united for considerable part, glabrous or with scattered hairs inside, mainly at tube base; broadest lobe ovate, about 1–1.5 mm broad, 2 mm long. Stamens about 10 mm long, with glabrous filaments, sometimes with isolated hairs at base. Capsule bilocular, orbicular or ovate, obtuse, 2–3 mm long, 2–2.5 mm broad, dehiscing by 4 teeth; style about 10 mm long, filiform. Seeds about 0.75 mm long, 0.3 mm broad, ovate, obtuse, sulcate-tuberculate. Flowering July (Plate XXIII, fig. 3).

Among scrub, in meadows.—*Soviet Far East*: Sakhalin. Described from Sakhalin Island. Type in Leningrad.

*Note.* Distinguished from *V. sibirica* L. by the leaf margin with fine up-curved serrations; the smaller flowers, glabrous or subglabrous inside; the shape and pubescence of the corolla lobes; and the shape of the capsule.

142. *V. cerasifolia* Monjuschko in Bot. mat. Gerb. Glavn. bot. sada, V, f. 8–9 (1924) 121; Stroh in Beih. Bot. Centralbl. LXI, 432.

Perennial. Rootstock woody, short. Plant subglabrous, 30–40 cm tall. Stem single, simple, subglabrous or with isolated simple hairs, with 8–12 internodes, woody at base. Leaves opposite, decussate or ternate,





broadly ovate, 5–8 cm long, 3–4 cm broad, subsessile or sessile, acute, slightly elongated, broadly dentate along margin, sometimes almost double dentate, with short-pointed teeth, cuneate, glabrous or sparsely hairy on both surfaces, sparsely ciliate along margin, paler beneath, with prominent veins, somewhat rigid; upper and lower leaves reduced, lower shedding after anthesis. Raceme about 3 cm long. Pedicels about 1 mm long or flowers subsessile, glabrouslike inflorescence axis. Bracts linear-lanceolate or linear, almost equaling calyx or upper bracts, shorter, ovate, glabrous. Calyx 5-partite almost to base, lobes oblong or oblong-lanceolate, acuminate. Corolla sky-blue, almost 3 times as long as calyx, about 6 mm long; tube densely pilose inside, 2 times as long as limb; lobes obtuse, 1.75–2 mm long, erect. Stamens and style scarcely exerted; filaments densely pilose in lower half; anthers oblong, about 1 mm long. Ovary glabrous. Fruit not known. Flowering August.

In dry loamy meadows.—*Soviet Far East*: Ussuri. Endemic. Described from basin of Lefu River. Type in Leningrad.

*Unclear and doubtful specific names*

1. *V. rupestris* Tardent Ess. Hist. Nat. Bessar. (1841) 49; Schmalh. Fl. II, 279; Stroh in Beih. Bot. Centralbl. LXI, 434.—Reported from Bessarabia.

2. *V. gadensis* Güld. It. I (1787) 426; Ldb. Fl. Ross. III, 256.—Reported from eastern Transcaucasia.

500 3. *V. heterophyllos* Böber ex Georgi, Besch. Russ. Beich. III, 4 (1775) 653.—Reported from Black Sea Region and Crimea.

4. *V. multifida* Georgi, It. I (1775) 195.—Reported from Dauria.

5. *V. multispicata* Güld. It. II (1788) 32, 33.—Reported from the foothills of the Caucasus.

**Genus 1342. LAGOTIS<sup>1, 2</sup> Gaertn.**

Gaertn. in Nov. Comment. Acad. Sc. Petrop. XIV (1770)

553—*Gymnandra* Pall. Reise, III (1776) 710.

Flowers; bisexual, generally irregular. Calyx persistent, gamosepalous, tubular or galeate, membranous, 3–5-toothed or 3–5-partite, sometimes cleft in front up to base, with 2–3 apical teeth on other side. Corolla

<sup>1</sup> Treatment by N.V. Vikulova; manuscript completed by B.K. Schischkin

<sup>2</sup> From the Greek *lagos*—hare and *ons* (genitive *otos*)—ear. Named for resemblance of 2-partite calyx to ears of hare.



gamopetalous, with short or long cylindrical tube, sometimes longitudinally cleft, with 3-4(5) lobes, sometimes irregularly bilabiate; upper lip flat, rarely recurved, entire or sinuate at tip, or shallow-bilobed; lower lip incised up to base into 2-3 recurved lobes. Stamens 2; Anthers sessile in corolla throat at upper lip margin (at base) or on somewhat long filaments, adnate below with lip margin. Pistil with long or short filiform style, terminating into capitate stigma, sinuate along margin; ovary superior, bilocular, sessile on cyathiform disc, latter growing into somewhat long appendage, adhering to ovary. Fruit bilocular, 2-seeded, oblong capsule, enclosed in dried up calyx and corolla, containing 2 seeds, one of them generally underdeveloped. Perennials, with obliquely ascending or almost horizontal rootstock, with partially ascending or erect stems, or plant acaulescent with entire or dentate leaves and spicate inflorescence, with flowers sessile in axils of membranous or herbaceous bracts:

This genus includes about 15 species, with the almost circumpolar distribution in the Arctic Region, and also in the Urals, the mountains of Siberia, Central Asia, Transcaucasia, and Asia Minor, and the Himalaya Mountains.

1. Plant acaulescent or with short leafless stem, often with aerial shoots absent; leaves lanceolate or linear, 2-20 mm broad. Bracts lanceolate .....2.
- + 501 Plant with branched leafy stem; aerial shoots absent; basal leaves ovate, rarely lanceolate, 1.5-8 cm broad; bracts ovate or orbicular, often pale sky blue .....3.
2. Shoots, if present, short, not exceeding 10 cm, leaves 0.2-0.8 cm broad (Soviet Central Asia) ..... 7. *L. korolkowii* (Rgl. and Schmalh.) Maxim.
- + Shoots always present, reaching 10-30 cm; leaves linear or narrowly lanceolate, 0.5-2 cm broad (Caucasus) ..... 8. *L. stolonifera* (C. Koch) Maxim.
3. Stem ascending or sprawling, basal leaves 5-10 (Pamiro-Alai, Tien Shan) .....4.
- + Stem erect, sometimes only partially ascending or flexuous, basal leaves 1-3 .....5.
4. Radical leaves on long petioles equaling lamina or several times longer; lamina ovate, 2.5-6 cm long, 1.5-3 cm broad, abruptly narrowed at base, with coarsely (sometimes incised) dentate margin ..... 5. *L. decumbens* Rupr.
- + Radical leaves with petioles shorter than lamina; lamina lanceolate, gradually narrowed into petiole, 5-12 cm long, 0.5-3 cm broad, entire or somewhat regularly dentate ..... 6. *L. ikonnikowii* Schischk.
5. Corolla 11-14 mm long, upper lip and lobes of lower lip 4.5-7 mm long ..... 1. *L. integrifolia* (Willd.) Schischk.

- + Corolla 8–9 mm long, upper lip and lobes of lower lip 2.5–3.5 mm long .....6.
- 6. Anthers with 2–4 mm long filaments, generally exceeding upper corolla lip; style long, exserted (Arctic Region) .....4. *L. minor* (Willd.) Standl.
- + Anthers sessile or with very short filaments, not exceeding 1 mm, shorter than upper corolla lip; style generally short, not exserted ...7.
- 7. Corolla dull white; lamina of radical leaves short-narrowed toward base .....2. *L. uralensis* Schischk.
- + Corolla sky-blue; lamina of radical leaves often cordate at base (Soviet Far East) ..... 3. *L. glauca* Gaertn.

Section 1. *Caulescentes* Maxim. in Bull. Acad. Sc. Pétersb. XVII (1872) 522.—Plant with developed erect or partially ascending stem. Rootstock oblique, elongated, producing underground shoots, neck covered with broadened petiole bases of dead leaves, not splitting up into fibers.

502 Stem leafy, leaves elliptical or ovate, dentate or entire. Bracts broad, obtuse, scarious along margin or entirely membranous, equaling calyx.

1. *L. integrifolia* (Willd.) Schischk. comb. nov.—*L. altaica* (Willd.) Smirn. in Izv. Mosk. Obsch. ispyt. prir. XLVI, 2 (1937) 97; Kryl. Fl. Zap. Sib. X, 2463.—*L. pallasii* (Cham. and Schlecht.) Rupr. Sertum tiansch. (1869) 64.—*L. glauca* ssp. *borealis* var. *pallasii* Maxim. in Bull. Acad. Sc. Pétersb. XXVII (1881) 522, p.p. —*L. glauca* var. *pallasii* Kryl. Fl. Alt. IV (1907) 999. —*Gymnandra borealis* Pall. Reise, III (1776) 710, p.p.; Turcz. Fl. baic.-dah. II, 388.—*G. integrifolia* Willd. in Ges. Nat. Fr. Berl. Mag. V (1811) 392.—*G. altaica* Willd. l.c. 393; Bge. in Ldb. Fl. alt. II, 420.—*G. elongata* Willd. l.c. 395. *G. pallasii* Cham. and Schlecht. in Linnaea, II (1827) 564, ex parte; Ldb. Fl. Ross. III, 332, ex parte.—*G. longiflora* Kar. and Kir. in Bull. Soc. Mosc. XV (1842) 417.—*G. borealis* var. *pallasii* Trautv. in Bull. Soc. Nat. Mosc. No. 4 (1866) 445.—*Bartsia gymnandra* L. fil. Suppl. (1781) 278, ex parte.—*l.c.*: Willd. l.c. tab. IX, f. 1 (sub *G. integrifolia*); tab. IX, f. 2 (sub *G. altaica*); tab. X, f. 7 (sub *G. elongata*); Printz. Veg. Sibir.-Mong. Front. 394.—*Exs.*: Smirn. Pl. alt. exs. No. 76.

Perennial. Plant glabrous throughout. Rootstock obliquely ascending or horizontal. Stem erect or sometimes ascending at base, simple, 10–40 cm tall. Basal leaves with petioles almost equaling lamina; lamina ovate or elliptical, somewhat thick, mucronate, rarely obtuse, cuneate at base, obscurely dentate rarely subentire, 3–15 cm long, 2–8 cm broad; cauline leaves smaller, sessile, obscurely dentate or entire. Inflorescence terminal, spicate; flowers sessile in bract axils. Bracts of lower flowers similar to upper cauline leaves, often dentate; bracts of upper flowers smaller, often pale sky-blue. Calyx tubular, semitransparent, cleft in front, with

2 laterally passing, green, branched veins, with 2 short, subobtusate teeth above, short-ciliate along margin. Corolla 11–14 mm long, dull white, often blackening when dry, 2–3 times as long as calyx; tube cylindrical, curved below middle almost at right angle; limb 4–5 mm long, upper lip oblong-elliptical or ovate, up to 2 mm broad, with 2 veins, entire or with 2–3 short teeth at tip, rarely bilobed, lower lip with 2–3 oblong-linear or linear lobes, about 1 mm broad. Anthers blue, subsessile or with 0.5 mm long filaments, not exerted. Style equaling, shorter or slightly longer than corolla tube; appendage of hypogynous disc fleshy, ribbed on 503 inner side, slightly shorter than ovary, almost 4-angled, slightly sinuate above. Capsule oblong, 5–6 mm long, longitudinally rugose. June to July (Plate XXIV, fig. 3).

In alpine zone in moss-lichen and rubbly tundra, on stony debris, rocks, on banks of rivulets near melting snow.—*Western Siberia*: Altai Mountains; *Eastern Siberia*: Angara-Sayan, Dauria; *Soviet Central Asia*: Dzh.-Tarbagatai, Tien Shan. *General Distribution*: Mongolia, Dzh.-Kashgar. Described from Siberia. Type in Berlin.

*Note*. Willdenow, in his well-known study of the genus *Gymnandra* (l.c.), paid special attention to the vegetative parts of this genus and, with the inadequate material available to him, differentiated a series of species by leaf structure. On the basis of further material collected by later authors, many of Willdenow's species were reduced to synonyms. For the plant growing in the Altai Mountains, in the mountains of Central Siberia and Central Asia, the name *Lagotis altaica* (Willd.) P. Smirn has been adopted in recent times. Meanwhile, according to the international rules of nomenclature, it becomes necessary to select the first in sequence of the three names given by Willdenow to the same species. The order of description and arrangement of the figures are as follows: *G. integrifolia* p. 392 (tab. 9, f. 1), *G. altaica* p. 393 (tab. 9, f. 2). *G. elongata* p. 395 (tab. X, f. 7).

The epithet *integrifolia* precedes the epithets *altaica* and *elongata*. This corresponds with the order of publication of the plates. From these three epithets, we must return the first, i.e., *integrifolia*.

It was not possible for us to restore the earlier name of Pallas (*Gymnandra borealis*), since it is clear from the author's description that he combined 3 species: *L. glauca* Gaertn., *L. integrifolia* (Willd.) Schischk. and *L. minor* (Willd.) Standl.

The epithet of Pallas is a 'nomen confusum' and cannot be used. The prior name *Bartsia gymnandra* L. fil. (1781), also cannot be used, since several species were combined under it.

2. *L. uralensis* Schischk. in Bot. mat. Gerb. Bot. Inst. Akad. Nauk SSSR XVII (1955).—*V. glauca* Korsh. Tentam. florum Rossiae orientalis,



312 (1895) non Gaertn.—? *L. borealis* (Pall.) Baill. ex Fedtsch. and Fler. Fl. Evrop. Ross. III (1911) 868.

Perennial. Rootstock vertical, short, sparsely branched. Stem erect, simple, 15–40 cm tall. Basal leaves (1)2–3, petioles longer or slightly shorter than lamina; lamina narrowly or broadly ovate, 4–16 cm long, 2–8 cm broad, obtuse or acute, crenate-dentate, sometimes subentire, gradually or abruptly narrowed at base; cauline leaves generally opposite in 2–4 pairs, rarely alternate, concentrated mainly in upper half of stem, sessile, semiamplexicaul, ovate or deltoid-ovate, 1–5 cm long, 1–3.5 cm broad, entire or obscurely dentate, acute. Inflorescence oblong at flowering stage, 2–5 cm long, 1–1.5 cm broad, later elongated up to 10 cm; flowers sessile in bract axils. Bracts of lower flowers similar to upper cauline leaves, upper smaller, with scarious margin. Calyx tubular, cleft in front. Corolla 9 mm long, dull white, tube cylindrical, curved almost at right angle below middle, upper lip sinuate above, lower generally bilobed. Stamens inserted in corolla throat, filaments short, 0.5–1 mm long. Capsule oblong, 6–7 mm long, 2 mm broad. Flowering June to July. Fruiting July to August.

In moss-lichen and mossy mountain tundras, in deciduous mountain forests, in cloudberry-sphagnum marshes. *European USSR*: Ural Mountains (central and southern parts: on Denezhkin, Kosvinsk, Konzhakovsk and other ranges, in Iremel Mountains). Endemic. Described from Konzhakovsk Range. Type in Leningrad.

3. *L. glauca* Gaertn. in Nov. Comment. Acad. Sc. Petrop. XIV (1770) 534, ex parte (pl. *Stellerana* exclus.); Hult. Fl. Kamtch. IV, 102.—*L. gmelini* Rupr. Sertum tiansch. (1869) 64; Kom. Fl. Kamch. III, 71.—*L. glauca* ssp. *borealis* var. *gmelini* Maxim. in Bull. Acad. Sc. Pétersb. XXVII (1881) 524.—*L. reniformis* Standl. in Bull. Filad. Mus. nat. hist. Chicago Bot. Soc. VIII (1931) 325.—*Rhinanthus glauca* Poir. Encycl. Suppl. II (1811) 309.—*Gymnandra borealis* Pall. Reise, III (1776) 711, quo ad pl. ex Kamtschatka.—*G. gmelini* Cham. and Schlecht. in Linnaea, II (1827) 561: DC. Prodr. XII, 25; Ldb. Fl. Ross. III, 332, pro max parte.—*G. ovata* Willd. Ges. Nat. Fr. Berl. Mag. V (1811) 395.—*G. reniformis* Willd. l.c. 396.—*Bartsia gymnandra* L. fil. Suppl. (1781) 278, ex parte.—*B. glauca* Poir. ex Steud. Nomencl. ed. 2, I (1840) 189.—*l.c.*: Gaertn. l.c. tab. XVIII, f. 2; Willd. l.c. tab. X, f. 8 and tab. X, f. 9; Hult. l.c. 104 (flower).

Perennial. Rootstock 0.7–8 cm long, 0.3–1 cm thick; neck covered with brown remnants of dead leaves. Stems 2–3, erect or ascending, 9–30 cm tall. Basal leaves 2–3 (rarely more), petioles nearly equaling lamina; lamina broadly ovate or oblong-ovate, short-pointed, coarsely crenate, 3–12 cm long 2–8 cm broad; cauline leaves ovate or orbicular, acute or obtuse, crenate, rarely entire, sessile. Inflorescence ovate or cylindrical,



2–9 cm long, 1.3–2.5 cm broad. Bracts pale sky-blue, membranous herbaceous; lower bracts similar to upper leaves, sometimes dentate, upper  
 505 bracts entire. Calyx tubular, cleft in front, with ciliate margin, slightly shorter than bracts. Corolla 2–3 times as long as calyx, sky-blue, 8–15 mm long, tube infundibuliform, curved below, 2–2.5 mm across above; limb 1/2 as long as tube; upper lip rectangular, entire above or with 2–3 short teeth, 2.5–3 mm long, 1.5–2 mm broad; lower lip bipartite, rarely 3-partite into obtuse or acute 2–3 mm long, 1–1.5 mm broad lobes (middle lobe narrower). Anthers blue, 1–1.8 mm broad, filaments adnate with margin of upper lip, anthers as a result appearing as sessile in middle of lip; rarely filaments deflected from lip. Style exserted. Capsule 6 mm long, 2–5 mm broad. June to July.

In moist meadows, grasslands, near springs and rivulets, in river valleys, among debris, often up to alpine zone. *Soviet Far East*: Kamchatka (Beringian and Commander Islands), Sakhalin (Kuril Islands). *General distribution*: Aleutian Islands. Described from Kamchatka. Type lost?

*Note*. The plant has a pleasant, delicate fragrance, similar to that of heliotrope.

4. *L. minor* (Willd.) Standl. in Publ. Field Mus. nat. hist. Chicago Bot. soc. VIII (1931) 325; Kryl. Fl. Zap. Sib. X, 2464.—*L. stelleri* Rupr. Fl. samojed. cisural. (1845) 49; Fedtsch. and Fler. Fl. Evrop. Ross. III, 868.—*L. glabra* var. *stelleri* Trautv. in Tr. Peterb. bot. sada, V (1877) 95.—*L. glabra* ssp. *borealis* var. *stelleri* Maxim. in Bull. Acad. Sc. Pétersb. XXVII (1881) 524.—*Gymnandra borealis* Pall. Reise, III (1776) 561, quoad pl. inter Lenam and Oceanum.—*G. minor* Willd. in Ges. Nat. Fr. Berl. Mag. V (1811) 393.—*G. dentata* Willd. l.c. 394.—*G. gracilis* l.c. 394.—*G. stelleri* Cham. and Schlecht. in Linnaea, II (1827) 563.—*Bartsia gymnandra* L. fil. Suppl. (1781) 278, quo ad pl. Ob infer.

Perennial. Rootstock vertical or obliquely ascending. Stem single, simple, 10–30 cm tall, covered at base with numerous brownish remnants of leaf petioles. Basal leaves 2–3, rarely 4; petioles almost equaling lamina; lamina lanceolate to elliptical, acute, dentate or crenate, rarely, entire, 2–12 cm long, 0.6–3(9) cm broad; cauline leaves ovate, acute, obscurely dentate or entire, sessile. Inflorescence cylindrical or ovate, 1–8 cm long, 1–1.8 cm broad. Bracts pale sky-blue, membranous-herbaceous, lower bracts similar to upper leaves, sometimes dentate, upper bracts entire. Calyx tubular, cleft in front, ciliate along margin, scarcely shorter than bracts. Corolla 1.5–2 times as long as calyx, bluish or whitish, 8–10 mm long, tube cylindrical, 2–2.5 mm broad, curved below, limb 1/2 as long as tube; upper lip suborbicular, entire above or slightly serrated, 2.5–3.5 mm long, 2–2.5 mm broad, lower lip bipartite, rarely 3-partite into acute or

obtuse lobes 2.5–3 mm long, 1.3–2 mm broad. Anthers blue, 1–1.6 mm broad; filaments diverging from upper lip, reaching its tip; style exerted. Capsule 6 mm long, 2.5 mm broad. July to August.

In mossy, moss-lichen, open grass tundra, on slopes.—*Arctic Region*: Arctic Europe (Bolshezemelskaya Tundra, Kanin Peninsula), Novaya Zemlya, Arctic Siberia, Chukotka, Anadyr; *Eastern Siberia*: Yenisei (between the settlement of Khantaiskaya and Medvezhii Kamen Range), Lena-Kolyma; *Soviet Far East*: Okhotsk, Zeya-Bureya (upper reaches of Namuga River, Zeya River drainage). *General distribution*: Bering Strait. Described from Eastern Siberia. Type in Berlin.

*Economic importance*: *L. minor* (Willd.) Standl. is eaten by domestic animals. According to the data of V.B. Sochava (Use of Plants of Extreme North as Fodder Crop), Lagotis contains 2.67% albuminous nitrogen, 3.63% raw fat.

5. *L. decumbens* Rupr. Sertum. tiansch. (1869) 64; G. Korzhinskii, Ocherki rast. Turkest. 96.—*L. grigorjevi* Krassn. in Bot. zap. II (1883) 19.—*L. glauca* ssp. *australis* Maxim. in Bull. Acad. Sc. Pétersb. XXVII (1881) 524, ex parte.

Perennial. Plant glabrous throughout. Rootstock reduced, about 6 mm thick, with numerous roots, with 1–3 ovate scales near neck, absent in young flowering samples. Stems 1–3, sprawling, 5–10(20) cm long, attenuate at base, almost filiform, flexuous, ascending and leafy above. Basal leaves with long (6–7 mm) petioles; lamina 2.5–6 cm long, 1.5–3 cm broad, dull, ovate, obtuse, abruptly or gradually narrowed into petiole, coarsely incise-dentate along margin, lower teeth subacute; cauline leaves 3–4, much smaller than basal, ovate, acute, narrowed at base, obscurely dentate along margin, sessile or short-petiolate. Inflorescence spicate, dense, reduced at flowering stage, 2.5 cm long, 1–2 cm broad. Bracts pale sky-blue, broadly ovate, lower up to 1 cm long, almost 0.7 cm broad, sometimes incise-dentate along one side of margin. Calyx with 2 almost free lobes. Corolla sky-blue, about 1 cm long, about 0.7 mm across at throat; lower lip 3–4-partite into short (1.5–3 mm long) lobes; upper lip entire or sinuate. Stamens inserted at base of upper lip. Style included. Fruit not known. June to July (Plate XXIV, fig. 1).

509 In alpine zone on moraine, along banks of rivulets, near glaciers, on stony and rubbly slopes and among debris up to 4800 m. *Soviet Central Asia*: Tien Shan, Pamiro-Alai. *General distribution*: Tibet (?). Described from Tien Shan, from Dzhamandaban Range. Type in Leningrad.

6. *L. ikonnikovii* Schischk. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR XVII (1955).

Perennial. Plant glabrous throughout. Rootstock vertical, with numerous roots. Stem ascending at base, simple, 7–30 cm tall. Basal leaves 5–10, petioles much shorter than or almost equaling lamina; lamina lanceolate or ovate-lanceolate, acute, gradually narrowed at base, entire or with a few, triangular, acute, regular teeth, (2.5)5–12 cm long, 0.8–3 cm broad; cauline leaves sessile, 1.5–4 cm long, 0.7–1.5 cm broad, short-pointed, entire or obscurely dentate. Inflorescence terminal, ovate or oblong, 2.5–6 cm long, 1.5–2 cm broad; flowers sessile in bract axils; bracts of lower flowers similar to upper cauline leaves, upper bracts smaller. Calyx tubular, cleft in front, with ciliate margin. Corolla 8–9 mm long, dull white, blackening when dry; tube cylindrical, curved almost at right angle below middle; limb 1/3–1/2 as long as tube; upper lip entire at tip or slightly sinuate, lower bipartite, with acute or obtuse lobes. Anthers blue. Style generally exerted. July to August (Plate XXIV, fig. 2).

In alpine meadows, near melting snow, along banks of rivulets, on stony and rubbly damp slopes at 3000–4300 m.—*Soviet Central Asia*: Pamiro-Alai, Tien Shan. Described from Darvaz Range. Type in Leningrad.

Section 2. *Acaules* Maxim. in Bull. Acad. Sc. Pétersb. XXVII (1881) 525.—Rootstock reduced, neck covered with fibrous remnants of dead leaves, often producing aerial shoots with regularly distributed scales, rooting at tip. Stem (flower scape) leafless, shorter than leaves; leaves lanceolate or linear, pointed, generally entire, rarely dentate. Bracts narrow, foliaceous, generally equaling corolla.

7. *L. korolkowii* (Rgl. and Schmalh.) Maxim. in Bull. Acad. Sc. Pétersb. XXVII (1881) 522, 525.—*Gymnandra korolkowii* Rgl. and Schmalh. in Tr. Peterb. bot. sada, V (1877) 627.—*Exs.*: Ed. Hort. bot. Petri Magni, No. 91.

Perennial. Rootstock reduced, vertical or obliquely ascending, densely covered with brownish fibrous remnants of leaves with numerous, somewhat thick roots. Stems single or 2–5, sometimes with short shoots trailing on ground having alternate, short 3–5 mm long, about 1 mm  
510 broad leaves; stems rooting above, forming leaf rosette. Radical leaves linear or lanceolate, 2–7 cm long, 2–6(8) mm broad, glabrous, entire or unequally dentate, acute, gradually narrowed toward base. Inflorescence subcapitate, 0.8–2 cm long. Bracts lanceolate, acute, entire, rarely obscurely dentate, green, herbaceous. Calyx tubular, cleft in front, with ciliate margin. Corolla 3–4 times as long as calyx, sky-blue, 8–16 mm long; tube erect, broadened above, up to 2–2.5 mm across; limb 1/3–1/2 as long as tube; upper lip orbicular-obovate or orbicular, 3–5 mm long, 2.5–5 mm broad, entire or sinuate above; lower lip bipartite into broadly ovate lobes 3–5 mm long, 1.3 mm broad, rarely partly divided or entire.



Anthers 1–1.5 mm broad, blue, on divergent filaments, reaching above middle of upper lip. Style exserted. Capsule (unripe) 5 mm long, 4 mm broad. July to August (Plate XXIV, fig. 4).

In alpine meadows, on stony slopes near snow banks, up to 4500 m.—*Soviet Central Asia*: Tien Shan, Pamiro-Alai. Described from Aktachtau Range. Type in Leningrad.

8. *L. stolonifera* (C. Koch) Maxim. in Bull. Acad. Sc. Pétersb. XXVII (1881) 524; Grossh. Fl. Kavk. III (1932) 394.—*Gymnandra stolonifera* C. Koch in Linnaea, XVII (1843) 289; Ldb. Fl. Ross. III, 333; Boiss. Fl. or. IV, 527.—*G. armena* Boiss. Diagn. pl. or. I, 4 (1844) 75.—*lc.*: Jaub. and Spach, Illustr. pl. or. tab. 254; Schmucker in Bot. Arch. IV, 228, f. 25 (flower).

Perennial. Rootstock reduced, 1–3 cm long, 0.5–1 mm thick, neck covered with fibrous remnants of dead petioles, scapes 1–3, rarely more; aerial shoots funiform, reaching 10–30 cm, with scattered, reduced up to 1 cm long, leaves, rooting near apex and forming rosette. Leaves numerous, exceeding scapes, petiolate; lamina longer than petiole, lanceolate, acute, dentate, entire only near tip and base or wholly entire, 3–12 cm long, 0.5–2 cm broad. Inflorescence ovate or subcapitate, up to 1.8 cm long, 0.8–2 cm broad. Bracts lanceolate, acute, entire, rarely obscurely dentate, herbaceous. Calyx tubular, cleft in front, ciliate along margin. Corolla 3–4 times as long as calyx, sky-blue, 10–19 mm long, tube erect, broadened above, up to 2–2.5 mm across, limb 1/3–1/2 as long as tube; upper lip orbicular-obovate or orbicular, entire or sinuate above, 4–5 mm long, 4–5 mm broad; lower lip bipartite into broadly ovate 4–5 mm long, 2–3 mm broad lobes, rarely partially divided or entire. Anthers 1–1.5 mm  
511 broad, blue, on divergent filaments, reaching the tip of upper lip. Style generally exserted. Capsule not known. April to May.

In alkaline meadows, on grassy and stony slopes, near roads up to 2100 m. *Caucasus*: eastern and southern Transcaucasia. *General distribution*: Asia Minor, Armenia-Kurdistan, Iran. Described from eastern Transcaucasia. Type in Berlin.

### Genus 1343. *NATHALIELLA*<sup>1,2</sup> B. Fedtsch.

In Bot. Zhurn. SSSR, XVII, 3 (1932) 327.

Calyx inserted with short tube, 5-lobed. Corolla with cylindrical tube, broadened at mouth, obscurely bilabiate, upper lip slightly shorter than lower, bilobed, lower 3-lobed. Stamens 4, in lower part of tube, reaching 1/2 its length; 2 upper stamens slightly shorter than lower, anther chambers

<sup>1</sup> Treatment by B.K. Schischkin.

<sup>2</sup> Named after the collector.





divergent at base. Ovary glabrous, bilocular, many seeded; style filiform, flat and broadened above. Capsule bilocular. Perennial acaulescent plant with rosette of radical entire leaves.

Monotypic genus, growing in Kirgizia on Alai Range.

1. *N. alaiica* B. Fedtsch. in Bot. zhurn. SSSR, XVII, 3 (1932) 327.—*Oreosolen alaicus* (B. Fedtsch.) Pavl. in Vestn. Akad. Nauk KazSSR, No. 5 (1953) 113.—*l.c.*: B. Fedtsch. *l.c.* 328.

Perennial. Plant acaulescent, with thick vertical root. Root neck densely covered with dead remnants of leaves and white bristly fibers. All leaves radical, entire and smooth-edged, lamina broadly ovate, 1–1.8 cm long, 0.5–1.2 cm broad, subobtuse, abruptly narrowed at base; petiole nearly as long as lamina, short-ciliate along margin. Flowers solitary, on very short pedicels. Calyx about 5 mm long, with 5 short, obtuse teeth, pilulose. Corolla pinkish violet, obscurely bilabiate, 15 mm long; tube cylindrical, slightly broadened near throat; limb 5-lobed. Stamens with slender, glabrous filaments. Ovary glabrous; style filiform, stigma flat, broadened. June.

On stony slopes and rocks.—*Soviet Central Asia*: Pamiro-Alai (Alai Range, Kutban-Kul Lake, Isfairam River). Endemic. Described from Alai Range, from vicinity of Kutban-Kul Lake. Type in Leningrad.

*Note.* N.V. Pavlov (*l.c.*) considers it more correct to combine the genus *Nathaliella* B. Fedtsch. with *Oreosolen* Hook., known from the Sikkim  
512 Himalayas. However, the following distinctive features speak against uniting them. In *Nathaliella*, the filaments are inserted on the lower part of the corolla tube and the anthers are in the middle of the tube, while in *Oreosolen*, the filaments are inserted near the mouth of the corolla and the anthers are exerted from the corolla tube; the style in *Nathaliella* is short and included in the corolla tube, while in *Oreosolen*, the style is exerted from the tube; the stigma in *Nathaliella* is flat and broadened, while in *Oreosolen*, it is capitate; staminodes are absent in *Nathaliella*, while *Oreosolen* has a subulate staminode; the corolla in the species of *Oreosolen* is distinctly bilabiate, in *Nathaliella* it is almost regular. All these distinctive features in the structure of the floral parts undoubtedly are of significance at the generic rather than specific level.

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Plate XXIV.

1. *Lagotis decumbens* Rupr., general appearance of plant, flower.—2. *L. ikonnikovii* Schischk., flower. —3. *L. integrifolia* (Willd.) Schischk., flower. —4. *L. korolkowii* (Rgl. and Schmalh.) Maxim., flower.

# Genus 1344. *SPIROSTEGIA*<sup>1, 2</sup> Ivanina

in Addenda XXI, 818.

Calyx oblong-ovate, with 5 broadly lanceolate teeth. Corolla persistent, yellow, large, infundibuliform, with short 5-lobed limb, subequal orbicular lobes and hairy ring inside in place of filament insertion. Stamens 4, much shorter than corolla; filaments densely pilose in lower part; anthers bilocular, chambers oblong-ovate, confluent at base; pollen grains compressed-globose, 18–19  $\mu$  long upto polar axis, trisulcate-triporate and tetrasulcate-tetraporate, with obscurely fine-reticulate exine texture. Ovary distinctly bilocular with axile placentation, with numerous ovules, ovoid, with long style and short, broad, bilobed stigma. Capsule bilocular, dehiscing by rupture along valves, completely enclosed by calyx. Seeds minute, about 1.2 mm long, oblong-lanceolate, slightly spirally curved, longitudinally rugose. Leaves alternate, orbicular or oblong-ovate, serrate-dentate. Flowers with 2 bracteoles, solitary in leaf axils, distributed throughout stem. Biennials or perennials, densely pubescent herbs with single or several stems and rosette of radical leaves.

Monotypic genus: Type of genus: *G. bucharica* (B. Fedtsch.) Ivanina.

*Note.* The sole species of this genus was referred earlier by B.A. Fedtschenko to the genus *Triaenophora* Solered., distributed in China (Hubei and Sichuan provinces). We are suggesting it into the separate  
513 genus *Spirostegia*, which differs from *Triaenophora* by the 5-toothed (and not 15-toothed) calyx, small (about 1.2 mm long), spirally curved, longitudinally rugose (and not minute—about 0.3 mm long—reticulate) seeds, presence of a hairy ring inside the corolla at the base of the stamen filaments and other features. *Spirostegia* is similar also in flower structure to *Rehmannia* Libosch. ex. Fisch., and Mey. (China and Korea), as signed by De Candolle and Solereder to the family Gesneriaceae. However, *Spirostegia* is well distinguished from *Rehmannia* by the over-all morphology (distribution of flowers along stem, etc.) and especially by the seeds (which are round, coarsely pitted and with membranous cell walls in the species of *Rehmannia*), by the structure of the ovary (in *Rehmannia*, the ovary is unilocular in the upper part with a parietal placenta, and bilocular with axile placentation in the lower part), the absence of secretory cells with red carotenoid pigment, which are present in species of genus *Rehmannia*, etc.

1. *S. bucharica* (S. Fedtsch.) Ivanina comb. nov.—*Triaenophora bucharica* B. Fedtsch. in Fedde, Repert. XII (1913) 538; B. Fedtsch. Rast. Turkest. 696; O. and B. Fedtsch. Perech. rast. Turkest. 6, 350; Nevski in

<sup>1</sup> Treatment by L.I. Ivanina.

<sup>2</sup> From the Greek *spiros*—spiral and *stega*—covering (referring to form of seed surface).

Tr. Bot. inst. ser 1, 4, 321; B. Fedtsch. in Fl. Turkm. VI, 279.— *Ic.*: Fl. Turkm. VI, Plate. XXXVI.— *Exs.*: Ed. H.B.P. No. 92.

Biennial or perennial. Rootstock brown, cylindrical, flexuous, thickened at base, producing several stems. Stem 15–40 cm tall, somewhat arcuate, ascending, tomentose in lower part, densely pilose in upper parts. Rosette leaves (1st year) ovate, petiolate, 2–7 cm long, 2–6 cm broad, with distinct reticulate venation, irregularly serrate, similar to cauline leaves, covered with multicellular, generally short (with multicellular head) glandular hairs; cauline leaves orbicular, 1–4 cm long, serrate-dentate, sessile or narrowed into short petiole. Flowers solitary in leaf axils almost throughout stem, sessile or on short pedicels, erect in bud, nodding later. Bracteoles 2, ovate-lanceolate, up to 8 mm long. Calyx, oblong-ovate, 12–16 mm long 7–10 mm broad, with 10 prominent veins, 5-toothed, teeth 2–4 mm long, acute, densely pilose along margin and veins. Corolla yellow, 2.5–3.5 cm long, infundibuliform, with 5-lobed limb; lobes 4–6 mm long, subequal, lower lobe slightly superior; corolla scattered hairy outside in upper part, pilose on lower part, except its glabrous lowermost tubular part; corolla pilose inside in lower part, otherwise glabrous or scattered hairy. Filaments slender, diverging from upper margin of lower tubular part of corolla, slightly arcuate-curved, scattered hairy, densely covered  
514 at base with hispid hairs (generally forming hairy ring). Ovary ovoid, acute, glabrous; style glabrous; stigma with equal triangular lobes. Capsule oblong-ovoid, acute, 8–14 mm long, 5–8 mm broad, dehiscent along valves, completely enclosed within calyx. Seeds minute, 1–1.4 mm long, 0.3–0.4 mm broad, brown, oblong-lanceolate, narrowed at ends, slightly spirally curved with longitudinal raphe, with hilum at lower end; seed surface covered with numerous, shallow, longitudinal pits. July to September (Plate XXV).

On dry slopes of foothills on porous gypsum outcrops. *Soviet Central Asia*: Pamiro-Alai (western part). Endemic. Described from Uzbekistan (near Derbent). Type in Leningrad.

### Genus 1345. *DIGITALIS*<sup>1, 2</sup> L

L. Sp. pl. (1753) 621.

Flowers in terminal unilateral or multilateral racemes. Calyx campanulate, 5-partite almost to base, persistent in fruit, upper (posterior) lobes slightly shorter than lower (anterior), ovate or lanceolate, generally hairy or ciliate, sometimes scarious along margin. Corolla slightly irregular, campanulate or inflated, bilabiate at margin; upper lip shorter than

<sup>1</sup> Treatment by L.I. Ivanina.

<sup>2</sup> From the Latin *digitus*—finger or thimble; named for the corolla shape.





Plate XXV.

*Spirostegia bucharica* (B. Fedtech.) Ivanina, general appearance of plant, corolla section, transverse section of ovary, pistil, seed, fruiting calyx, capsule.

lower, bilobed, lower 3-lobed, middle lobe exceeding short, indistinct lateral lobes. Stamens 4, inserted in lower part of corolla, 2 upper stamens shorter than lower; anthers bilocular, confluent, pollen grain globose or deltoid-globose, 18–25  $\mu$  long at polar axis, trisulcate, exine granular or pitted; pistil with long style and short bilobed stigma. Capsule ovoid or oblong-ovoid with short beak, bilocular, septicidal. Seeds very minute, numerous, yellow or light brown, quadrangular-prismatic or ovate-pitted, embryo cylindrical. Perennial herbs (shrubs and semishrubs in western Mediterranean Region) with tall, erect, simple stem, with alternate, entire, oblong-lanceolate or lanceolate, acute leaves, gradually transforming into floral leaves.

517 This genus includes 36 species, distributed over the Northern Hemisphere, mainly in the Mediterranean Region. The USSR has 6 species.

*Economic importance:* All species of this genus are poisonous plants containing compound glucosides, having severe effect on heart.

1. Raceme unilateral; corolla campanulate; middle lobe of lower corolla lip less than 1/3 as long as corolla tube. (Section 1. *Grandiflorae* Benth.) .....2.
- + Raceme somewhat multilateral; corolla globose-inflated, middle lobe of lower corolla lip equaling tube or exceeding 1/3 its length. (Section *Globiflorae* Benth.) .....4.
2. Corolla red (very rarely white); flowers 30–40 mm long; leaves velutinous, dark green above, grayish tomentose underneath ..... *D. purpurea* L.
- + Corolla yellow or whitish yellow; leaves shining, thin, green, sparsely pilose along margin and underneath .....3.
3. Corolla yellow, flowers 30–35 mm long; leaves oblong-ovate or lanceolate, 7–25 cm long, 2–6.5 cm broad .....1. *D. grandiflora* Mill.
- + Corolla whitish yellow; flowers 15–20 mm long; leaves narrowly lanceolate, sharply serrate, 4–7 cm long, 0.5–1.5 cm broad ..... *D. ciliata* Trautv.
4. Calyx lobes lanceolate, not scarious along margin; inflorescence axis, calyx lobes and bracts densely lanate ..... 6. *D. lanata* Ehrh.
- + Calyx lobes ovate or oblong, scarious along margin .....5.
5. Calyx lobes acute or acuminate, glabrous, shining, oblong; raceme generally not very compact, 10–30 cm long; leaves and stem glabrous ..... 5. *D. nervosa* Steud. and Hochst.
- + Calyx lobes obtuse; lower leaves sparsely pilose along margin and beneath .....6.
6. Corolla 16–24 mm long, about 10 mm broad, tube globose-inflated .. 3. *D. ferruginea* L.

- + Corolla 8–16 mm long, about 7 mm broad; tube slightly inflated; raceme generally very compact, many-flowered, long. ....  
 .....4. *D. schischkinii* Ivanina.

Section 1. *Grandiflorae* Benth. in DC. Prodr. X (1846) 450.—Biennials and perennials. Flowers red and/or yellow, large (1.5–4 cm long), in somewhat unilateral raceme. Corolla tube irregularly  
 518 campanulate; middle lobe of lower lip less than 1/3 as long as tube, covered by upper lip in bud. Stamens and pistil included. To this are referred 12 species.

\**D. purpureae* L. Sp. Pl. (1753) 622; Lindl. Digit. mon. (1821) 9; Benth. in DC. Prodr. X, 451; Ldb. Fl. Ross. III, 228; Hegi, Illustr. Fl. Mittel-Eur. VI, 66.—*D. thapsi* Bert. Fl. Ital. VI (1844) 403. non L.—*l.c.*: Lindl. l.c. tab. 2; Monteverde, Bot. atlas, plate 55, fig. 5; Hegi, l.c. tab. 240.—*Exs.*: Fl. exs. austro-hung. No. 3286; Schulz, Herb. norm. No. 2767.

Biennial, perennial. Stem 30–120 cm tall, erect, sulcate, somewhat uniformly leafy, densely covered with simple and glandular hairs. Leaves velutinous, dark green and scattered hairy above, canescent, tomentose with long, multicellular (2–5-cellular with subobtusate terminal head) often fugacious and glandular (with 2–4-cellular head), hairs beneath, with very prominent reticulate venation, irregularly crenate, rarely serrate, rosette and lower cauline leaves 12–20(35) cm long, 3–7(11) cm broad, ovate or oblong-ovate, acuminate, sharply narrowed into long (3–11 cm) petiole; upper cauline leaves short-petiolate or sessile, 1/2 the size of lower leaves or smaller, ovate or ovate-lanceolate. Flowers in somewhat dense, unilateral, many-flowered, pyramidal, generally long raceme. Bracts ovate or oblong-lanceolate, acute, as long as, or exceeding pedicels. Pedicels 0.5–1 cm long (up to 2 cm in fruit), densely covered with glandular hairs. Calyx lobes 8–13 mm long (up to 15 mm in fruit) and 4–8 mm broad, oblong-ovate, pointed. Corolla purple or rarely white, with white patch on lower inner surface of tube, with several purple spots, 3–4 cm long, tubular-campanulate, glabrous outside, densely patently hairy inside lower lip, hairs almost closing tube mouth; limb very short; upper lip with 2 small, elongated lobes, lower deltoid, obtuse, equaling about 1/3 of corolla length. Stamens glabrous. Ovary glandular-pubescent. Capsule 8–12 mm long, 6–9 mm broad, ovoid, obtuse, densely covered with glandular hairs. Seeds ovate or quadrangular-prismatic, 0.6–0.8 mm long, 0.4–0.6 mm broad. June to July.

Widely cultivated as ornamental and medicinal plant, mainly in European part of USSR. Grows wild in open forests among scrub, on mountain slopes and hills in southern Scandinavia, Central and Atlantic Europe. Described from Western Europe. Type in London.



*Note.* Among cultivated plants of *D. purpurea*, a wide-ranging variation is observed in corolla color (purple to white), form of the corolla (519 campanulate to tubular), form of inflorescence (dense to lax, few-flowered raceme), height and color of stem, leaf shape, etc. Besides, there are differences in life span (most plants are biennials, some the perennials, and in very rare cases, annuals). In cultivation, the following forms and varieties are distinguished.

f. *gloxiniiflora* hort.—Plant taller and larger than typical forms, with longer raceme, and broader corolla tube, with very bright spots on lower lip.

f. *flore albo* hort.—Flowers white.

f. *monstrosa* hort.—Terminal flower peloric.

f. *maculata* hort.—Corolla with bright spots on inner side of lower lip.

f. *caule rubra* hort.—Stem red.

Besides, several other forms are well known, as for example, f. *lutzii* hort., f. *isabelliana* hort. and others.

Purple foxglove more or less easily hybridizes in gardens and in nature with several other foxglove species, especially *D. lutea* L. Usually, such hybrids of *D. purpurea* L. enter our botanical gardens from Western Europe under particular specific names, as, for example:  $\times$  *D. purpurascens* Roth., *D. rigida* Lindl., *D. lutescens* Lindl., *D. tubiflora* Lindl., *D. lindleyana* Tausch. and others.

Hybridization of *D. purpurea* L. with *D. grandiflora* Mill. yielded several forms of practical interest. These include:

*D. purpurea* L.  $\times$  *D. grandiflora* Mill. (*D. kutukovii* Ivan.)—Plant dark green, densely covered with simple and glandular hairs. Stem 40–80 cm tall, generally branched, densely leafy. Leaves ovate, narrowed into petiole. Flowers 28–35 cm (sic) long. Calyx lobes 9–12 mm long, lanceolate, acute. Corolla yellowish pink or greenish red, dark-punctate on inner surface of lower lip, campanulate; lateral corolla lobes deltoid, acute, 2–3 mm long; lower lip 4–5 mm long. August to September.

*Economic importance:* Used as a medicinal and ornamental plant. Purple foxglove is used in medicine as an important cardiac remedy. A pharmaceutical agent is obtained from the leaves, which contain glucoside compounds, having strong affect on the heart. Leaves, of *D. purpurea* contain complicated complex of genuine glucosides, from which the following are isolated: purpurea-glucoside A ( $C_{47}H_{74}O_{18}$ ), and purpurea-glucoside B ( $C_{47}H_{74}O_{19}$ ). In fermentative hydrolysis, genuine glucosides decompose, producing digitoxin ( $C_{41}H_{64}O_{13}$ ) and gitoxin ( $C_{41}H_{64}O_{14}$ ). In acid hydrolysis, digitoxigenin ( $C_{23}H_{34}O_4$ ) and gitoxigenin ( $C_{23}H_{34}O_5$ ) are obtained.

Studies by pharmacologists and therapists have shown that the characteristic therapeutic effect of foxglove derives from the summary (520 action of the active elements present in it. However, the strongest poison



is digitoxin, and hence the essential physiological action is attributed to it. The content of digitoxin in the leaves varies between 0.2 and 0.5% of absolute dry weight. Foxglove is used in cases of weakness of the heart muscle and the failure of the inhibitory effect of the vagus nerve. This plant is cultivated in the Central and Southern European part of the USSR for its medicinal use.

1. *D. grandiflora* Mill. Gard. Dict. ed. VIII (1768) No. 4.—*D. ambigua* Murr. Prodr. Stirp. Götting. (1770) 62; Lindl. Digit. mon. 19; Schmalh. Fl. II, 269; Hegi. Illustr. Fl. Mittel-Eur. VI, 68; Wulff in Tr. prikl. bot. gen. i sel. XX, 354; Grossh. Fl. Kavk. III, 395; Kryl. Fl. Zap. Sib. 10, 2465.—*D. ochroleuca* Jacq. Fl. Austr. I (1773) 37; Lindl. l.c., 14.—*D. lutea* Pall. Hist. pl. Palat. II (1777) 199, non L.—*D. grandiflora* Lam. Fl. Fr. I (1778) 332; Boiss. Fl. or. IV, 429; Kryl. Fl. Alt. IV, 935.—*D. grandiflora* All. Fl. Pedem. I (1785) 70; Benth. in DC. Prodr. X, 453; Ldb. Fl. Ross, III, 227.—*D. milleri* Don, Gen. Syst. IV (1838) 506.—*l.c.*: Lindl. l.c. tab. 7 and 8; Rchb. l.c. Fl. germ. XX, tab 1690; Gofman, Bot. alt. plate 128; Syreishch. III. fl. Mosk, gub. III, 140; Hegi. l.c. tab 240.—*Exs.*: Hayek, Fl. Stir. exs. No. 387; Fl. Hung. exs. No. 458; Callier, Pl. Hercegov. exs. No. 286; Orphanides, Fl. gr. exs. No. 724.

Perennial. Rootstock short, fibrous, multiheaded. Stem erect, 40–120 cm tall, simple, rarely branched at raceme base, covered with glandular hairs in upper part, with long isolated hairs in lower part, glabrous or scattered hairy in middle. Leaves light green, generally oblong-lanceolate, acuminate, serrulate or entire, covered with glandular (with unicellular stalk and bicellular head) and simple (generally 6-cellular) hairs underneath, especially along veins and margins; rosette and lower cauline leaves oblong-lanceolate, 7–25 cm long, 2–6.5 cm broad, gradually narrowed into short and broad petiole; middle cauline leaves ovate-lanceolate, generally sessile; upper cauline oblong-lanceolate, about 4 cm long, 1 cm broad, sessile, gradually reducing in size and transforming into bracts. Flowers horizontally divergent, nodding, generally in short (6–25 cm long) and lax raceme. Pedicels glandular-pubescent, 2.5 mm long in flowers, 5–15 mm in fruit. Calyx lobes lanceolate, acute, glandular-hairy, 4–7 mm long, 1–2 mm broad, up to 9 mm in fruit. Corolla sulfureous yellow, with brownish veins on inner surface, yellow or brown when dry, diffusely glandular-pubescent outside, 3–4 cm long, 15–20 mm broad, 521 irregularly campanulate; upper lip obscurely bilobed, about 2 mm long, middle lobe of lower lip deltoid, acute, 5–7 mm long, lateral lobes deltoid, subacute, 2–3 mm long. Capsule ovoid, 8–14 mm long, 5–8 mm broad, subobtuse, densely pilose. Seeds quadrangular-prismatic, 0.8–1.2 mm long, about 0.5 mm broad. June to July.

Deciduous and mixed forests, forest edges, logged areas, often on turf-covered and stony slopes among scrub, rarely in mixed-grass meadows.—*European USSR*: Baltic Region, Upper Volga, Volga-Kama, Upper Dnieper, Volga-Don, Trans-Volga Region, Upper Dniester, Basarabia, Black Sea Region: *Western Siberia*: Ob' Region, Upper Tobol.

*General distribution*: Scandinavia, Central and Atlantic Europe, Mediterranean Region, Balkan States-Asia Minor. Described from Europe. Type in London.

*Economic importance*: Leaves are used in medicine for treatment of heart diseases, like leaves of *D. purpurea* L.

Cultivated in gardens and parks. Due to its perennial character and greater winter-resistance, cultivation of this species is preferred to that of *D. purpurea*. The plant excels, besides, by its ornamental quality.

2. *D. ciliata* Trautv. in Mém. Biol. VI (1860) 7; Radde in Bull. Acad. Sc. Pétersb. X, 397; Boiss. Fl. or. IV, 432; Schmalh. Fl. II, 269; Wulff in Tr. prikl. bot. gen. i sel. XX, 385; Grossh. Fl. Kavk. III, 394; Kolakov. Fl. Abkhaz. IV, 105; Kam.-Nat. in Fl. Gruz. VII, 591.—*Exs.*: Fl. Cauc. exs. No. 169; GRF, No. 831.

Perennial. Rootstock multiheaded, woody, with several stems; underground stem parts often crowded turflike, covered with remnants of dead leaves. Stems 30–60 cm tall, green or lilac-violet, well-formed, virgate, uniformly leafy, covered, especially densely in middle, with patent, long hairs, curved when dry. Leaves sessile, lanceolate, acute, serrate, with a few serrations elongated into short cusps, bright green, sparsely hairy above, pale green, more hairy, with slightly prominent midrib beneath; radical and lower cauline leaves 4–7 cm long, 0.5–1.5 cm broad, generally dying off by flowering stage; upper cauline leaves slightly shorter than middle and lower, otherwise similar. Flowers horizontally divergent, in comparatively short (about 10 cm long), lax, and generally distinctly unilateral raceme with slender, flexuous, slightly glandular-pubescent or glabrous axis, somewhat distant from upper cauline leaves. Pedicels slender, long, usually about 0.7 cm except in lower flowers, where they reach 7 cm, obliquely erect, somewhat appressed to peduncle, glabrous. Bracts ovate-lanceolate or lanceolate, acute, uninerved, almost equaling or 2 times as long as flowers. Calyx lobes about 5 mm long, orbicular or ovate, obtuse, 5–7 veined, with scarious and densely ciliate margin. Corolla yellowish white or dull white, 15–20(25) mm long, 10–15 mm broad, campanulate, densely covered with multicellular glandular hairs along inner margin of lower lip; lobes subequal, ovate, obtuse, slightly recurved; upper lip parted into 2 closely disposed small lobes, generally with narrow triangular sinus in between; lower lip slightly (by 2–4 mm) longer than upper. Stamens and pistil at anthesis as long as

corolla tube; filaments and anthers glabrous. Ovary densely glandular-pubescent; stigma very minute, hypogynous disk clearly visible around ovary, excreting large quantity of sugary substance (copiously flowing on to lower corolla lip during fair weather). Capsule 5–7 mm long ovoid, almost equaling or slightly exceeding calyx, glabrous. Seeds light yellow, quadrangular-prismatic, 1–1.2 mm long, about 0.6 mm broad. June to July.

In subalpine and alpine zones, generally on rocks, debris, shale outcrops, rarely in pine forests.—*Caucasus*: Ciscaucasia, western Transcaucasia. Endemic. Described from Georgia. Type in Leningrad.

*Economic importance*: Good honey plant; with some ornamental value, though little used in horticulture; contains glucosides of cardiac group.

Section 2. *Globiflorae* Benth. in DC. Prodr. X (1846) 449.—Flowers light or dark brown, in somewhat compact, multilateral raceme; corolla tube inflated; middle lobe of lower lip reaching 1/2 tube length or longer, overlapping upper lip in bud. This section includes 10 species.

3. *D. ferruginea* L. Sp. pl. (1753) 622; Lindl. Digit. mon. 17, p.p.: Griseb. Spicil. Fl. Rum. and Bith. II, 33; Benth. in DC. Prodr. X, 450, p.p.: Boiss. Fl. or. IV, 429, p.p.: Wulff in Tr. prikl. bot. gen. i sel. XX (1929) 351, p.p.: Grossh. Fl. Kavk. III, 395, p.p.: Kem.-Nat. in Fl. Gruz. VIII, 592.—*D. aurea* Lindl. l.c. 18.—*D. brachyantha* Griseb. l.c. 513.—*D. pichleri* Huter in Oestereich. Bot. Zeitschr. LVII (1907) 200.—*l.c.*: Sibth. and Sm. Fl. gr. VII, 606; Rchb. Ic. fl. germ. XX, tab. 1694; Javorka ès Csapody, Iconogr. fl. Hung. 3332b.—*Exs.*: Orphanides. Fl. gr. No. 40.

523 Perennial. Rootstock horizontal, woody, with single stem and rosette of radical leaves. Stem 40–70(120) cm tall, erect, slightly arcuate-ascending at base, generally simple (rarely branched at lower part of inflorescence), sulcate, sparsely pubescent below or glabrous throughout. Rosette and radical leaves 7–15(40) cm long, 1–2.5(3) cm broad, oblong-lanceolate, acuminate, narrowed at base into petiole (2–4 cm long, about 0.5 cm broad), with prominent arcuate veins beneath, diffusely pubescent with multicellular and glandular hairs, especially along veins and margin; middle and upper cauline leaves oblong-lanceolate or linear-lanceolate, more acute than lower leaves, often folded in pairs, obscurely veined, glabrous. Raceme 15–25(40) cm long, cylindrical, pointed above, sparsely flowered at base and in middle, somewhat densely so in upper part with sessile flowers and buds; flowers nodding on thick 2–5 mm long pedicels in axils of lanceolate, acute bracts, equaling or exceeding calyx and corolla tube. Calyx lobes 7–10 mm long, with broad, colorless, scarious margin, ovate-lanceolate, obtuse, margin ciliate. Corolla 16–22 mm long, rusty-yellow or yellowish brown, with brown or lilac veins; tube 8–10 mm long, globose-inflated; upper lip with 2 short lobes; lateral lobes at lower



lip deltoid, middle oblong-ovate, 6–10 mm long, densely covered with multicellular and glandular hairs. Stamens glabrous, included. Capsule ovoid, 0.7–1 cm long, glabrous. June to August.

In forest glades, among scrub; from lower forest zone to subalpine meadows.—*Caucasus*: southern and eastern Transcaucasia. *General distribution*: Mediterranean Region, Balkan States-Asia Minor, Armenia-Kurdistan. Described from Italy. Type in London.

*Note.* *D. ferruginea* L. is a species more polymorphic than other species of foxglove. Some authors have tried to separate individual forms from Asia Minor as species, others as varieties. We have only separated most of the Caucasian foxgloves (as the more studied areas) as the distinct species described below. The minority of the Caucasian plants (from Armenia, environs of Borzhomi, etc.) are left within the range of the present species.

*Economic importance*: Leaves of this species are used in the USSR for manufacture of valuable medicinal preparations of a cardiac group (digalen-neo, chordigit, satiturani) and in popular medicine.

4. *D. schischkinii* Ivan. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, IX (1946) 204; Grossh. Opređ. rast. Kavk. 316; Kolak. Fl. Abkhaz. IV, 106; Kem.-Nat. in Fl. Gruz. VII, 592.—*D. ferruginea* auct. fl. Cauc.

Perennial. Rootstock horizontal, oblique or almost vertical, generally short, dark brown, woody, producing numerous adventitious roots, especially in upper part. Stem single, erect from arcuate base, 50–150 cm tall, simple or weakly branched in upper part, sulcate, glabrous above, scattered hairy in lower part, with rosette of radical leaves at base, generally dying off by flowering stage. Leaves oblong-lanceolate, subobtusate, somewhat narrowed into petiole, with slightly prominent midrib and 4–6 irregularly arcuate lateral veins and obscure reticulate venation; radical and lowermost cauline leaves 8–30 cm long, 2–6 mm broad, oblong-ovate, gradually narrowed toward base into long petiole, scattered hairy along margin and veins; middle cauline leaves sessile, oblong-lanceolate, acute, glabrous, upper lanceolate, acuminate, gradually reducing upward along stem and imperceptibly transforming into bracts. Raceme 15–40 cm long, many-flowered (up to 100 flowers), generally compact, pointed above; flowers on 2–3 mm long pedicels, in bract axils. Bracts swordlike, linear-lanceolate, acute, with single distinct midrib, as long as calyx or corolla tube, except lower bracts much exceeding flower. Calyx lobes 4–6(7) mm long, orbicular-elliptical, obtuse, with broad, colorless scarious margin, densely glandular-pilulose. Corolla ginger yellow or yellowish green, with brown veins, 8–12(18) mm long; tube somewhat inflated, rarely short-infundibuliform, 6–10 mm long, 3–4 mm broad; upper lip with 2 obtuse upcurved lobes; lateral lobes of lower lip deltoid, subobtusate, recurved;



middle lobe of lower lip 3–10 mm long, oblong-lanceolate or oblong-ovate, obtuse, densely covered with multicellular and glandular hairs. Stamens glabrous, almost equaling corolla tube; anthers exerted in mature flowers. Capsule 7–10 mm long, ovate, acute, glabrous. Seeds quadrangular-prismatic, 1.2–1.5 mm long, about 0.8 mm broad. July to September.

Among scrub, in glades, at edges of broad-leaved forests, from lower to subalpine zone, in humus-rich, as well as in sandy-loam and sandy soils.—*Caucasus*: Ciscaucasia, western and eastern Transcaucasia. *General distribution*: Asia Minor. Described from Caucasus. Type in Leningrad.

*Economic importance*: Leaves of this species, as in the preceding species, are used for the manufacture of valuable medicinal preparations of a cardiac group (Digalenneo, Chordigit, Satiturani) and in popular medicine.

5. *D. nervosa* Steud. and Hochst. ex Benth. in DC. Prodr. X (1846) 450; Ldb. Fl. Ross. III, 227; Boiss. Fl. or. IV, 430; Wulff in Tr. prikl. bot. XX, 352; Grossh. Fl. Kavk. III, 359; Kem.-Nat. in Fl. Gruz. VII, 591.—*D. laevigata* C.A.M. Verz. Pflanz. Cauc. Casp. Meer (1831) 110, non Waldst. and Kit.

525 Perennial. Rootstock fibrous or irregularly cylindrical, woody, with ring of slender interlocked secondary rootlets, glabrous or round-pitted inward, generally with single stem and rosette of radical leaves. Stem 30–80 cm tall, cylindrical, sulcate, glabrous, generally sparsely leafy. Leaves oblong-lanceolate, entire, glabrous; rosette and radical leaves obovate-lanceolate, 10–20(30) cm long, 2.5–5(7) cm broad, subacute with 4–6 distinct lateral veins beneath, diverging from midrib at very acute angle, narrowed into short, glabrous petiole; cauline leaves 4–12 cm long, oblong-lanceolate, subacute or acute, sessile, with less number of veins and obscurely arcuate-nerved venation, compared with lower leaves. Flowers generally in lax, 10–30(50) cm long, almost multilateral raceme. Pedicels distinct, 2–4 mm long, in axils of lanceolate, acute, glabrous bracts. Bracts equaling or slightly exceeding calyx lobes, except lower bracts, similar to upper cauline leaves. Calyx lobes dark green, shining, rigidly scarious along margin, 5–7 mm long, 4–5 mm broad, oblong-ovate, acute, somewhat keeled-overlapping, glandular-hairy along margin. Corolla light brown or yellow, darkening when dry, 14–22(30) mm long, short-campanulate; tube slightly inflated; lobes of upper lip minute, 1–2 mm long, deltoid, covered, similar to other lobes, by glandular and simple hairs; lateral lobes of lower lip 2–3 mm long, deltoid, acute; middle lobe distinct, somewhat markedly prominent, 3–7 mm long, ovate or obtuse-deltoid. Filaments and pistil glabrous, equaling corolla tube; anthers slightly exerted in mature flowers. Capsule 9–12 mm long, ovate, acute, with diverging calyx lobes. July to August.

In broad-leaved forests.—*Caucasus*: southern and eastern Transcaucasia, Talysh. *General distribution*: Iran. Described from Talysh. Type in Berlin.

6. *D. lanata* Ehrh. Beitr. VII (1792) 152; Lindl. Digit. mon. 19; Griseb. Spicil. Fl. Rum. and Bith. II, 33; Benth. in DC. Prodr. X, 450; Boiss. Fl. or. IV, 430; Velenovsky, Fl. Bulg. 422.—*D. nova* Winterli, Ind. hort. bot. univ. Hung. (1788) 72 (n. n.).—*D. ferruginea* Lam. Encycl. méth. bot. II (1790) 280.—*D. winterli* Roth, Catal. bot. I (1797) 71.—*D. eriostachya* Bess. in Rchb. Hort. Bot. III, 3 (1827) 12.—*D. epiglottidea* Brera in Steud. Nomencl. Bot. ed. I (1840) 507.— *Ic.*: Waldst. and Kit. Pl. rar. Hung. I (1802) tab. 74; Rchb. Ic. fl. germ. XX, tab. 1693; Javorka és Csapody, Iconogr. fl. Hung. 3330.—*Exs.*: Orphanides, Fl. gr. No. 726; Fl. Exs. austro-hung. No. 2195.

Biennial or perennial. Rootstock horizontal, woody. Stem single, erect, partially ascending at base, generally dark lilac, simple, somewhat uniformly leafy, lowermost leaves dying off by early anthesis, usually glabrous below, inflorescence axis densely tomentose. Radical and lower cauline leaves 6–12(20) cm long, 1.5–3.5 cm broad, oblong-ovate, obtuse or acute, covered with simple and glandular (with 1–2-cellular heads) hairs, like upper cauline leaves, generally entire, rarely slightly sinuate or sparsely denticulate, with distinct midrib and 3–4 lateral veins; upper cauline leaves lanceolate, 4–10 cm long, sessile, acute, gradually reducing and transforming into bracts. Raceme pyramidal, somewhat long, rather dense, multilateral; inflorescence axis, bracts and calyx lobes densely pubescent; flowers on short, glandular-pubescent pedicels in bract axils. Bracts oblong-lanceolate, equaling or exceeding calyx. Calyx lobes 10 mm long, lanceolate, acute, not divergent in fruit. Corolla 20–30 mm long; tube globose-inflated, brownish yellow with lilac veins; upper lip shallowly incised into 2 deltoid, upcurved lobes; lower lip with small, deltoid, lateral, recurved lobes, with large white or reddish, spatulate middle lobe, almost equaling corolla tube. Stamens at anthesis equaling corolla tube, glabrous. Pistil pubescent. Capsule 8–12 mm long, conical, obtuse, with short beak, glandular-hairy. Seeds quadrangular-prismatic, 1.1–1.3 mm long, about 0.6 mm broad. July to August.

Among scrub, in forests and meadows, along calcareous and clayey slopes of mountains and hills.—*European USSR*: Upper Dniester, Bessarabia. *General distribution*: Central Europe, Balkan States-Asia Minor. Described from cultivated plants, apparently from Berlin. Type not known.

*Economic importance*: Leaves of *D. lanata* are used in Western Europe for obtaining crystalline glucosides, used in medicine, for cardiac diseases. In USSR, this plant is under testing.

Tribe 3. GERARDIEAE Benth. in DC. Prodr. X (1846) 506.—Corolla bilabiate, with flat lobes, 2 posterior lobes usually internal. Stamens connivent in pairs; anther locules pointed at base, not confluent, second chamber often absent. Fruit a capsule. At least lower leaves opposite.

**Genus 1346. LEPTORHABDOS<sup>1, 2</sup> Schrenk**

Schrenk in Fisch. and Mey. Enum. pl. nov. (1841) 23; Benth. in DC. Prodr. X (1846) 510.—*Dageria* Decne. ex Jacq. Voy. Ind. IV (1844) 116.

Calyx campanulate, 5-partite up to 1/3–1/2 with subequal, linear-  
527 lanceolate, acute lobes or teeth. Corolla 3–8 mm long, tubular-infundibuli-  
form, with 5-lobed limb divided almost to base; lobes orbicular, obtuse.  
Stamens 4, didynamous, inserted in lower part of corolla, included; anthers  
ellipsoid, confluent above, lower ends diverging acute, dehiscing by longi-  
tudinal slit; ovary obovoid, bilocular with axile placentation; ovules 1–2 in  
locule; pistil with long style and short, capitate stigma. Capsule obovate,  
compressed, dehiscing by valves, with 1–2 seeds in locule. Seeds about  
2 mm long, cuneate to oblique-truncate, rugose, shining.

Annual herbs with long, branched or simple, 4-angled stems and pin-  
natispartite or entire opposite leaves. Inflorescence paniculate, lax, long,  
each branch forming raceme.

This genus is monotypic, distributed in Himalayas, Afghanistan, Cen-  
tral Asia, Iran and eastern Transcaucasia.

1. *L. parviflora* Benth. in DC. Prodr. X (1846) 510.—*Gerardia*  
*parviflora* Benth. in Wall. Cat. (1829) No. 3888 and Scroph. Ind.  
(1835) 48.—*Leptorhabdos micrantha* Schrenk in Fisch. and Mey.  
Enum. pl. nov. (1841) 23; C. and B. Fedtsch. Perech. rast. Turkest. 5,  
98.—*L. brevidens* Fisch. and Mey. Ind. sem. hort. Petrop. IX Suppl.  
(1843) 13.—*L. benthamiana* Walp. Rep. III (1844–1845) 387.—*L. linifo-*  
*lia* (Decne.) Walp. l.c. 388.—*L. virgata* Benth. in DC. Prodr. X (1846)  
510; Grossh. Fl. Kavk. III, 395.—*L. glutinosa* Freyn in Bull. Herb.  
Boiss. V (1897) 797.—*Dageria linifolia* Decne. ex Jacq. Voy. Ind. IV  
(1844) 116.—*D. pinnatifida* Decne. l.c.—*l.c.*: Decne. l.c. pl. 121.—*Exs.*:  
HFAM, No. 169, 199a.

Annual. Stem erect, 10–70 cm tall, virgate, green or lilac, 4-angled,  
glabrous, or rarely sparsely pilose in lower part, somewhat glandular-  
pubescent in upper part, branched; branches opposite and obliquely di-  
vergent, generally from middle of stem, rarely almost at right angle from  
base (var. *divaricata* Vved.). Leaves almost opposite (usually one leaf

<sup>1</sup> Treatment by L.I. Ivanina.

<sup>2</sup> From the Greek *leptos*—slender and *rhabdos*—willow; from general appearance of plant.



separated from the other by 2.4 mm); lower leaves generally pinnatipartite, ovate or oblong-ovate, 4–8 mm (sic) long, lobes 1–5 pairs, linear, unequal, 2–3 cm long, 1–3 mm broad, rarely leaves 3-partite or entire, in latter case linear, entire or lanceolate, unequally sinuate or unequally dentate, acute, petiolate, glabrous, often shedding at flowering stage; upper cauline leaves shorter than lower and middle, 2.5 cm long, otherwise sessile, similar to lower cauline leaves. Racemes branched at base like stem; flowers generally opposite, rarely alternate (flower in one bract axil not developing);  
 528 lower flowers in raceme rarely distant, upper somewhat crowded; flowers 2–5 mm long, glandular-pubescent. Bracts 3–7 mm long; lanceolate or linear; lower bracts often exceeding flowers, middle generally equaling calyx tube. Calyx 3–8 mm long, campanulate, glandular-pubescent, 10-veined; 5-partite up to  $1/3$ – $1/2$  of tube length [var. *micrantha* (Schrenk) Ivanina] into linear-lanceolate lobes or teeth, extending into short claw at tip. Corolla 3–8 mm long, pink or lilac glabrous, tubular, infundibuliform, with 5-lobed limb; lobes 1–2 mm long, orbicular divided almost to base. Stamens 4, inserted in lower part of corolla; filaments glabrous, anthers ellipsoid, parallel up to maturity stage, separating at dehiscing stage and perpendicular to filaments. Ovary obovate, 1–2 mm long, glabrous, compressed, somewhat bilobed above; pistil with long glabrous style and short capitate stigma. Capsule cinnamon brown, obovoid, 4–7 mm long, obtuse. Seeds 1.7–2.4 mm long, cunneate or obliquely truncate, distinctly ribbed between irregular angles with 12–16 deep, longitudinal, irregular folds; folds finely transversely rugose. July to August.

Along banks of rivers, brooks and lakes, in sands, in steppe, in juniper forests. Often as a weed in fields, near roads, near irrigation canals. *Caucasus*: Eastern Transcaucasia (rare); *Soviet Central Asia*: Kara Kum, Balkhash Region, mountainous Turkmenia, Amu Darya, Pamiro-Alai, Syr Darya, Tien Shan, Dzh.-Tarbagatai. *General distribution*: Iran, India—Himalayas, Dzh.-Kashgar.

*Note*: Study of samples collected by Schrenk in Dzhungar Ala-Tau and described as *L. micrantha* Schrenk has shown that compared to the typical plants most of them actually have longer calyx teeth (reaching up to  $1/2$  tube length) and broader leaf lobes. However, similar forms of calyx teeth and leaves are observed also in plants growing in Ili River basin, on the Pamir (environs of Khorog, etc.), on banks of Lake Iskanderkul, in the Kugitang foothills etc. O. and B. Fedtschenko (l.c.) have reported calyx lobes of various length, sometimes on the same plant. Hence, it is better to regard these similar plants as a variety, var. *micrantha* (Schrenk) Ivanina. We also think that the plant described as *L. linifolia* (Decne.) Walp. and distributed in Himalayas along with *L. parviflora* Benth., but distinguished by entire, sometimes 3-partite of leaves, longer bracts and a more deeply parted calyx, is another of its forms—var. *linifolia* (Decne.)



Ivanina. Finally, *L. glutinosa*, described from Iran and characterized by densely glandular pubescence, apparently is a third form—var. *glutinosa* (Freyn) Ivanina.

529

### Genus 1347. *RHAMPHICARPA*<sup>1, 2</sup> Benth.

Benth. in Hook. Comp. Bot. Mag. I (1835) 368; DC. Prodr. X, 503—*Macrosiphon* Hochst. in Flora, XXIV (1841) 373.—*Bradshawia* F. Muell. in Proc. Linn. Soc. New South Wales, 2 Ser. VI (1892) 473.

Flowers large, on long, opposite, axillary pedicels. Calyx campanulate or tubular-campanulate, 5-partite. Corolla white or grayish yellow, with slender, long exserted, erect or curved tube and limb with 5 obovate, subequal lobes. Stamens 4, didynamous, included, with unilocular obtuse anthers; pistil one, with ovoid bilocular ovary and long, clavate style, thickened above. Capsule ovate, laterally compressed, oblique, apiculate or rostrate, dehiscent by valves, valves coriaceous, entire. Seeds numerous, minute, obovate or oblong. Herbs (blackening when dry), with entire or pinnatipartite leaves; lower leaves opposite, upper alternate, covered with minute, shining, white verrucae along margin and sometimes on surface.

This genus includes 15 species, distributed in Tropical Africa, Eastern India and Australia.

1. *R. medwedewii* Alb. in Tr. Bot. sada, XII, No. 9 (1893) 435; Bull. Herb. Boiss. I, 248; Grossh. Fl. Kavk. III, 395.—*lc.*: Bull. Herb. Boiss. I, tab. XI.—*Exs.*: Herb. Fl. Cauc. No. 98; Fl. Cauc. exs. No. 246; Pl. or. exs. No. 148.

Annual. Plant 10–20 cm tall, glabrous. Stem erect, profusely branched. Leaves pinnatipartite, 1–5 cm long, with narrowly filiform or linear-setiform, grooved, 1.2–2 cm long, 0.5–0.6 mm broad lobes, with minute, white, flat, elliptical verrucae along margin. Flowers large. Pedicels (0.6)1.3–2.3 cm long, glabrous, axillary, opposite. Bracts filiform, (2.5)5–7 mm long, 0.5 mm broad, opposite. Calyx campanulate, 1–1.5 cm long, 0.5 mm (sic) broad, 2/9–1/4 as long as corolla; calyx lobes broadly ovate at base, 2 mm long and broad, subulate-cuspidate, 0.8–1.3 cm long. Corolla 4.3–4.8 cm long, 2.4 cm across; white, purple in lower part of mouth (blackish or pale sky-blue when dry), sparsely veined, with erect, 3.4–3.8 cm long, 0.5 mm broad, slender tube, inflated above, 3.5–4.5 mm broad, and spreading exposed limb with broad, orbicular-ovate, 1–1.2 cm long, subequal lobes; lobes entire or somewhat sinuate. Stamens 4, with 1 mm long filaments, inserted in upper, broader

<sup>1</sup> Treatment by S.G. Gorschkova.

<sup>2</sup> From the Greek *ramphos*—curved beak and *carpos*—fruit from the form of the capsule, apiculate or rostrate.

part of tube, with elliptical-linear, subobtusate, vertical anthers, dorsally adnate (in middle). Ovary ovoid or oblong-ovoid, 3 mm long, 1.5 mm broad, glabrous, with long style, 10 times as long as ovary. Capsule oblong-ovoid, (1.7)2 cm long, 0.5–0.6 cm broad, 1.25 times as long as calyx, veined along margin, narrow winged, dark cinnamon brown, smooth, many-sided, with erect, 0.5 cm long beak. Seeds oblong, 0.8 mm long, 0.3 mm broad, cinnamon brown, with outer reticulate coat. June to July.

In lowlands and marshes.—*Caucasus*: western Transcaucasia. Endemic. Described from Imeretia (Lake Paleostom). Type in Tbilisi.

*Note.* Albov considers *R. medwedewii*, as the only surviving representative of this tropical genus of the *Buechnerinae* (tribe Gerardiaceae of the Scrophulariaceae) in the Caucasus, close to *R. fistulosa* Benth. from Nubia and Abyssinia.

Tribe 4. EUPHRASIEAE Benth. in DC. Prodr. X (1846) 526.—*Rhinantheae* Wettst. in Pflanzenfam. IV, 3b (1897) 97.—Corolla bilabiate; upper lip often galeate. Stamens connivent in pairs; anther chambers parallel, usually pointed at base. Leaves opposite or alternate. Plants often semiparasites, very rarely parasites.

### Genus 1348. *CASTILLEJA*<sup>1, 2</sup> L.f.

L.f. Suppl. (1781) 47.—*Euchroma* Nutt. Gen. Am. II (1818) 54.—*Castillejoa* Post. and Ktze. Lexic. Gen. Phaner. (1903) 104.

Calyx tubular, laterally compressed, often broadened at base, 2-partite above; lobes entire, irregularly dentate or shortly labiate. Corolla with long tube enclosed in calyx, and bilabiate limb; upper lip elongated, narrow, erect, scaphoid-concave, entire; lower lip small, inflated in lower part, 3-lobed. Stamens 4, inserted in corolla tube a little above middle, unequal; 2 stamens opposite upper lip shorter than others. Pistil 1, with bilocular ovary, slender long style and capitate, somewhat sinuate stigma. Capsule bilocular, bivalved, many-seeded, valves entire. Seeds minute, with transparent outer coat, coarsely cellular or pitted. Flowers numerous, short-pedicellate, in terminal, dense, spicate inflorescence. Bracts oblong, colored. Perennial herbs, with erect stems and alternate, entire leaves.

Of the 32 species distributed in Northern Asia, North and South America, the USSR has 2 species.

1. Inflorescence 3–12 cm long; bracts oblong or oblong-elliptical, 0.7–3.5 cm long, pale yellow (rarely red); corolla pale yellow (rarely red), 2.3–3 cm long,  $1\frac{1}{3}$  as long as calyx; stems single or few (2–7), erect, 20–50 cm tall ..... 1. *C. pallida* (L.) Kunth.

<sup>1</sup> Treatment by S.G. Gorschkova.

<sup>2</sup> Named in honor of the Spanish botanist Castillejo.

- + Inflorescence 3–5 cm long; bracts oblong or broad-ovate, reddish violet, 1.2–1.6 cm long; corolla reddish violet, 1.2–1.6 cm long, almost equaling calyx; stems numerous (7–20), somewhat spreading, 10–20 cm tall ..... 2. *C. arctica* Kryl. and Serg.

1. *C. pallida* (L.) Kunth, Syn. Fl. Aequin. II (1823) 100; Benth. in DC. Prodr. X, 531; Ldb. Fl. Ross. III, p. I, 257; Turcz. Fl. baic.-dah. II, 349; Kryl. Fl. Alt. IV, 951; O. and B. Fedtsch. Perech. rast. Turkest. 5, 98; Fedtsch. Rast. Turkest. 696; Kom. and Alis. Oprod. rast. Dalnevost. kr. II, 924; Kryl. Fl. Zap. Sib. X, 2466.—*Bartsia pallida* L. Sp. pl. (1753) 602.—*C. sibirica* Lindl. in Bot. Reg. (1825) in nota ad tab. 925; Bge. in Ldb. Fl. alt. II, 421.—*C. acuminata* Turcz. in Bull. Soc. Nat. Mosc. XXIV, II (1851) 321.—*lc.*: Bot. Tidskr. XVII, 221; Fedtsch. and Fler. Fl. Evrop. Ross, fig. 842; Sugawara, Illustr. Fl. Saghal. IV, tab. 767.

Perennial. Plant 20–50 cm tall, covered with multicellular, white hairs. Stems erect, simple, few (2–8) or single, cylindrical, unbranched. Leaves linear or linear-lanceolate, sometimes lanceolate, 3–9 cm long, 0.2–0.6 cm broad, entire, mucronate, 3-veined, sometimes broadened at base, sessile. Flowers on pubescent, 3–4 mm long pedicels, in compact, spicate, 3–12 cm long, 2 cm broad inflorescence. Bracts oblong or elliptical, broad, covered with short white hairs, 0.7–3.5 cm long, 0.4–0.8(1) cm broad, pale yellow or red (var. *rubra* Drob.), irregularly dentate or cristate in upper part; lobes oblong or lanceolate, 3–4 mm long, 1 mm broad. Calyx pale yellow, 1.4–2 cm long, at least  $\frac{2}{3}$  as long as corolla, densely covered with long, multicellular hairs, shallowly bilobed; lobes 7 mm long, bipartite with oblong-linear, 4–5 mm long, 1–1.5 mm broad segments, or sometimes lobes unequally dentate. Corolla pale yellow or white, sometimes reddish in upper part or red throughout (var. *rubra* Drob.), 2.3–3 cm long, with narrow, 2 cm broad, long tube, 2 times  
532 as long as limb, subglabrous below, densely covered above with long, white, multicellular hairs, bilabiate; upper lip narrow, 4–5(7) mm long, 2–3 mm broad, 2 times as long as lower lip, generally tapering above into sharp beak, patently white-puberulent, densely outside in middle part, sparsely inside; lower lip slightly divergent, 2–2.5(3.5) mm long, deeply parted, 3-lobed, sparsely pilulose on both surface lobes oblong, 1–1.5 mm long, 0.8 mm broad, obtuse, white-puberulent, densely outside, sparsely inside. Stamens with anthers strongly diverging downward. Ovary ovoid, 4 mm long, 2.5 mm broad, smooth, dark cinnamon brown; style  $5\frac{1}{2}$  times as long as ovary, with capitate stigma. Capsule oblong or oblong-ovoid, 1–1.5 cm long, 0.4–0.5 cm broad, pointed, smooth, slightly shorter than calyx, cinnamon brown. Seeds oblong, 1.8 mm long, 0.8 mm broad, obtuse-triangular, with shining pitted outer membrane. June to July.



Tundra, dry steppe, alkaline and floodplain meadows; among birch, birch-pine and larch forests, scrub, in forest glades, fire clearings, on mountain slopes; as weed among cereal crops, in abandoned cultivated fields.—*Arctic Region*: Chukotka, Anadyr; *European USSR*: Volga-Kama; *Western Siberia*: all regions; *Soviet Far East*: Kamchatka, Zeya-Bureya, Uda Region. *General distribution*: North America. Described from Siberia. Type in London.

*Economic importance*: Honey plant.

2. *C. arctica* Kryl. and Serg. in Sist. zam. Gerb. Tomsk. Gos. univ. 1–2 (1939) 5; Kryl. Fl. Zap. Sib. X, 2468.

Perennial. Plant 10–20 cm tall, pubescent with distant matted hairs. Stems 7–20, somewhat spreading. Leaves alternate, linear or lanceolate, or upper leaves ovate-lanceolate, all 3-veined, long acuminate, 2–7 cm long, 2–9 mm broad. Flowers in compact, spicate, 2–5 cm long inflorescence. Lower bracts broadly ovate, 3–3.5 cm long, 1.2–1.6 cm broad, reddish violet, pubescent, cristate-partite above into linear, 0.5–1.3 cm long, 1–3 mm broad lobes, 2–3 on either side; upper bracts smaller, with 5–7 shorter lobes on either side. Calyx colored, 1.5–1.8 cm long, almost equaling corolla, 1/2 or more parted into 2 lobes, each deeply incised into linear, 3–7 mm long, 1–2 mm broad, obtuse segments. Corolla reddish violet, 1.2–1.5 cm long, bilabiate; tube glabrous below, covered in upper part with long white hairs; upper lip erect, with oblong or obtuse-deltoid teeth above and 2 short teeth along margins at base; lower lip 3-lobed, with oblong-ovate, 1.5–2.5 mm long, 1.5–2 mm broad, obtuse lobes. Style exserted. August.

533 In meadows and on slopes in moss-lichen tundra. *Arctic Region*: Arctic Europe, Novaya Zemlya, Arctic Siberia (Yamal Peninsula), Chukotka. Described from Ob' Region—near Cape of Kotelnikov. Type in Tomsk.

*Note*. The anthers of this species separate it from *C. elegans* Malte (Rhodora, XXXVI, No. 425, 1934, 187), described from Northwest America.

### Genus 1349. *MELAMPYRUM*<sup>1, 2</sup> L.

L. Sp. pl. (1753) 605; Beauv. in Mém. Soc. Phys. Hist. Nat. Genève. 38, 6 (1916) 291; Soó in Fedde, Repert, XXIII (1926) 159 and XXIV (1927) 127.—*Marinella* Bubani, Fl. Pyr. I (1897) 261.

Flowers generally large, sessile or on glabrous or pubescent pedicels, in axils of large bracts, in terminal spicate or racemose inflorescences on stem and branches. Bracts ovate-lanceolate or linear-lanceolate,

<sup>1</sup> Treatment by S. G. Gorskova.

<sup>2</sup> From the Greek *melas*—black and *pyron*—grain; seeds of this plant, when mixed with flour, give darkish color to bread.

usually laterally incise-dentate or setose-dentate, rarely entire. Calyx tubular-campanulate, 4-toothed, glabrous or pubescent, upper teeth sometimes large, all acute, rarely obtuse. Corolla bilabiate, glabrous or generally puberulent; tube cylindrical, slender, gradually broadened above, exposed, slightly broadened at base; upper lip galeate, laterally compressed, with narrow, recurved margin; lower lip slightly exceeding upper, patent, with 2 tubercles (palates) at base and 3 short, equal lobes above. Stamens 4, didynamous, inserted in upper part of tube; anthers connivent, almost vertical, bilocular; chambers with sharply pointed appendages at base, long-barbate along upper margin. Pistil 1; with bilocular ovary; style filiform, long curved above, glabrous or pubescent in upper part; stigma capitate. Capsule compressed, ovate or semiglobose, glabrous or puberulent, obtuse or apiculate, bilocular, loculicidal, dehiscing from anterior or both sides, with 1–2 seeds per locule. Seeds 4 mm long, 1.5–2 mm broad, elliptical or oblong, almost trigonous, smooth, arillate. Annuals, semiparasites, glabrous or pubescent. Stems erect, somewhat branched. Leaves green, opposite, lanceolate, linear or ovate, generally acuminate, entire or upper leaves incised at base, subsessile or on short, 1–2 mm long petioles.

Of the 35 species distributed in Europe, Asia and North America, the USSR has 16.

- 534 1. Flowers multilaterally divergent, in dense spicate-cylindrical inflorescence ..... 2.  
 + Flowers unilaterally divergent, in sparse, racemose secund inflorescence ..... 8.  
 2. Bracts orbicular-cordate or orbicular-reniform, longitudinally folded, cristate-dentate, imbricate; flowers in dense 4-angled inflorescence; calyx unequally dentate, capsule dehiscing only from anterior side .  
 ..... 1. *M. cristatum* L.  
 + Bracts ovate-lanceolate, flat, entire or dentate at base, or deeply cristate-dentate; flowers in cylindrical, dense inflorescence; calyx teeth equal; capsule dehiscing bilaterally, very rarely unilaterally 3.  
 3. Capsule dehiscing unilaterally; bracts yellowish green; calyx subglabrous ..... 2. *M. chlorostachyum* Beauv.  
 + Capsule dehiscing by 2 valves; bracts green or pinkish purple, rarely yellowish green or white ..... 4.  
 4. Calyx 2/5–1/2 as long as corolla; tube glabrous at base, densely pubescent above with long white or brown hairs; teeth long-ciliate along margin; capsule setose throughout, sometimes glabrous at base  
 ..... 5.

- + Calyx 2/3 as long as corolla; tube and teeth densely puberulent, tube short-ciliate along margin; capsule glabrous ..... 6.
5. Plant 20–40 cm tall; flowers in subcylindrical 5–12 cm long, 3–5 cm broad spicate inflorescence; corolla 2–3.2 cm long; style 5–7 times as long as ovary ..... 3. *M. caucasicum* Bge.
- + Plant 3–10(15) cm tall; flowers in short, ovate-globose, 2–4.5 cm long, 1.8–3 cm broad spicate inflorescence; corolla 1.4–1.8 cm long; style 4 times as long as ovary ..... 4. *M. albofianum* Beauv.
6. Leaves entire, bracts yellowish green; calyx teeth shorter than corolla tube; corolla 1.5–2 cm long ..... 7. *M. elatius* Reuter.
- + Leaves entire or with 2–4 long, acute teeth at base; bracts pinkish purple, white or pale yellow; calyx teeth equaling corolla tube; corolla 1.2–2.5(3) cm long ..... 7.
7. Plant 15–50 cm tall; bracts pinkish purple; corolla 2–2.5(3) cm long, purple ..... 5. *M. arvense* L.
- + Plant 25–40 cm tall; bracts white or pale yellow; corolla 1.2–1.7 cm long, pale yellow or almost white ..... 6. *M. argyrocomum* Fisch.
8. Bracts colored; corolla pink or yellow ..... 9.
- 535 + Bracts green; corolla generally yellow or golden yellow ..... 12.
9. Corolla yellow ..... 10.
- + Corolla pink or purple ..... 11.
10. Calyx densely villous-lanate; plant up to 50 cm tall; leaves ovate-lanceolate, up to 4 cm broad; inflorescence up to 17 cm long ..... 8. *M. nemorosum* L.
- + Calyx glabrous or ciliate along veins; plant up to 70 cm tall; leaves elliptical-lanceolate or lanceolate, up to 2.5 cm broad; inflorescence up to 9 cm long ..... 9. *M. polonicum* (Beauv.). Soó.
11. Leaves lanceolate or ovate-lanceolate, 0.5–1.5(2.5) cm broad; bracts ovate or oblong, or ovate-lanceolate, lower bracts entire or sometimes dentate, upper generally subulate-dentate; calyx teeth deltoid-lanceolate, acute or subulate-acuminate; corolla dark pink, rarely white ..... 10. *M. roseum* Maxim.
- + Leaves linear or linear-lanceolate, 1.5–3 mm broad, sometimes almost ovate, 5–8 mm broad (*β. latifolium* Nakai); bracts lanceolate-linear, sometimes almost ovate (*β. latifolium* Nakai), subulate-dentate or setose-dentate; calyx with long aristate, unequal teeth; corolla pink ..... 11. *M. setaceum* (Maxim.) Nakai.
12. Corolla 0.8–1 cm long with open mouth; capsule bilaterally dehiscent ..... 13.
- + Corolla 1.4–1.8 cm long, with closed mouth; capsule with unilateral anterior dehiscence ..... 15.
13. Plant pubescent, rarely subglabrous; corolla yellow or golden ... 14.



- + Plant glabrous, corolla milk-white; lower lip with 3–5 dark blood-red or violet stripes and sometimes with 2 orange spots ..... 14. *M. saxosum* Baumg.
- 14. Plant up to 40 cm tall, branches recurved; corolla golden or dark yellow ..... 12. *M. silvaticum* L.
- + Plant up to 25 cm tall, branches somewhat appressed, corolla yellow; lower lip scarlet, spotted ..... 13. *M. herbichii* Wołoszczak.
- 15. Leaves ovate-lanceolate, 4–9 cm long, (0.3)0.5–1.2 cm broad; bracts lanceolate, entire or slightly sinuate-dentate, or upper bracts with a few subulate-linear teeth; corolla 1–1.8 cm long, generally yellow, sometimes white or purple ..... 15. *M. pratense* L.
- + Leaves oblong-lanceolate, 5–7.5 cm long, 0.7–2 cm broad; bracts ovate, deeply parted, with 5–9 lanceolate-linear, long lobes; corolla 1–1.3 cm long, yellow or almost white ..... 16. *M. laciniatum* Koshewn and Zing.

536 Section 1. *Spicata* (Wettst.) Soo in Fedde, Repert. XXIV (1927) 130.—Sect. *Eumelampyrum* subsectio *Spicata* Wettst. in Pflanzenfam. IV, 3b, 99.—Flowers divergent in all directions, in dense, spicate-cylindrical inflorescence.

Subsection 1. *Carinata* Beauv. in Mém. Soc. Phys. Hist. Nat. Genève, 38, 6 (1916) 428.—Bracts orbicular-cordate or orbicular-reniform, longitudinally folded, cristate-dentate, imbricate. Flowers in dense, 4-angled inflorescence. Calyx teeth unequal. Capsule only unilaterally dehiscent.

1. *M. cristatum* L. Sp. pl. (1753) 605; M.B. Fl. taur.-cauc. III, 411; Benth. in DC Prodr. X, 583; Ldb. Fl. Ross. III, 304; Boiss. Fl. or IV, 480; Schmalh. Fl. II, 290; Soó in Fedde, Repert. XXIV, 141; Kryl. Fl. Zap. Sib. X, 2469.—*M. solstitiale* Ronnig. in Dörfler, Schedae ad Herb. norm. Cent. XLVIII (1907) 247.—*M. cristatum* subsp. *solstitiale* Ronnig. in Vierteljahrschr. Naturf. Gesellsch. in Zürich, LV (1910) 308.—*M. cristatum* var.  $\gamma$ . *solstitiale* Maly in Magyar. bot. lapok VII (1908) 231.—*M. cristatum* subvar. *eu-solstitiale* (Ronnig.) Beauv. in Mém. Soc. Phys. Hist. Nat. Genève, 38, 6 (1916) 471.—*M. solstitiale* Stank. in Stank. and Tal. Opred, vyssh. rast. Evrop. ch. (1949) 822.—*M. ronnigeri* Pöevertl. in Allg. Bot. Zeitschr. XIII (1907) 177.—*Marinella cristata* Bubani, Fl. Pyr. I (1897) 605.—*Ik.*: Fedtsch. and Fler. Fl. Evrop. Ross. fig. 826; Syreistsch. Ill. fl. Mosk. gub. III, 171; Hegi, Illustr. Fl. Mittel-Eur. VI, 1, 73; Maevsk. Fl. 7th ed., fig. 269.—*Exs.*: GRF, No. 477; Herb. Fl. Ingr. Nos. 471b, 474b, Pl. Finl. exs. No. 940, 941, 2079; Fl. exs. austro-hung. No. 3699; 3700; Herb. Norm. No. 4742, 4743.

Annual. Plant (8)15–50 cm tall, sparsely pubescent with short, white, generally retrorse setiform hairs. Stem obtusely 4-angled erect, simple or branched above; branches 9–18 cm long, generally floriferous and spreading. Leaves lanceolate or linear, lower 3–4 cm long, 0.3–1.2 cm broad, entire, narrowed at base into 1 mm long petiole; upper leaves 4.5–8 cm long, (0.3)0.8–1.2 cm broad, sessile, generally hastate or irregularly unequally dentate at base; all white-puberulent on both surfaces and along margin, hairs appressed. Flowers on 0.7–1 mm long pedicels divergent in all directions, in spicate, 4-angled, dense, 1–5 cm long, 1.3–2 cm broad inflorescence. Bracts yellowish green, light purple or raspberry-red (f. *purpurascens* Nasar.), connivent and imbricate, orbicular-cordate or orbicular-reniform, 0.6–1.2 cm long, 0.8–1.5 cm broad, longitudinally folded, with raised unequally cristate, sharply toothed and ciliate margin, narrowed above; lower bracts narrowed into lanceolate-linear, deflexed, entire, 3 cm long acuminate tip; bract margin covered with unicellular, antrorse hairs; upper bracts with 0.5–1 cm long, upcurved tip. Calyx 4.5–8 mm long, 3/4 as long as bract, with glabrous, 2.5–4 mm long tube, long-ciliate along ribs and with lanceolate, acute, unequal teeth; 2 upper teeth 2.5–4 mm long, 1.5 mm broad, 2 times as long as lower, falcate-deflexed; all teeth with sparse, long, 2-cellular, sharp hairs along margin. Corolla 1.3–1.5 cm long, yellowish white; lower lip slightly deflexed, bright yellow or purple, yellow inside, or corolla raspberry-red, with bright yellow lower lip, with 3 purple-violet veins (f. *purpurascens* Nasar.). Stamens with 2.5 mm long anthers with sharp, subequal appendages. Ovary ovoid, glabrous, 2 mm long, 1.5 mm broad; style glabrous, 6 times as long as ovary, curved above. Capsule semiglobose or oblong-ovoid, 0.8–1 cm long, 0.5–0.7 cm broad, 2 times as long as calyx, arcuate-curved, pointed, glabrous, with anterior dehiscence; valves sharp, with minute triangular hairs along margin. Seeds oblong, 4 mm long, 1.5 mm broad, dark cinnamon brown. June to September.

In deciduous and rarely pine forests, marshy shrub forests, along forest edges and in glades, floodplain forests, marsh meadows, solonetz soils, herbaceous-mixed-grass and needle-grass steppes.—*European USSR*: Karelia-Lapland, Dvina-Pechora, Baltic Region, Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Trans-Volga Region, Bessarabia, Black Sea Region, Lower Don, Upper Dniester; *Caucasus*: Ciscaucasia (Naurskaya); *Western Siberia*: all regions; *Eastern Siberia*: Yenisey; *Soviet Central Asia*: Aral-Caspian Region. *General distribution*: Scandinavia, Central and Atlantic Europe, Mediterranean Region (western part), Balkan States-Asia Minor. Described from Northern Europe. Type in London.

Subsection 2. *Arvensia* Ronnig. in Fritsch in Mitt. Naturw. Ver. f. Steierm. LIV (1918) 288.—Bracts ovate-lanceolate, flat, entire, dentate or

deeply dentate-cristate at base. Flowers in dense, cylindrical inflorescence. Calyx teeth equal. Capsule bilaterally, very rarely unilaterally dehiscent.

Series 1. *Chlorostachya* Gorschk.—Calyx glabrous, puberulent only along veins, 1/2–2/3 as long as corolla. Capsule glabrous.

2. *M. chlorostachyum* Beauv. in Mém. Soc. Phys. Hist. Nat. Genève, 38, 6 (1916) 471; Soo in Fedde, Repert. XXIV, 137; Grossh. Fl. Kavk. III, 396; in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XIII, 24.—*M. chlorostachys* Hohen. Enum. Talysch. (1838) 81, nom. nud.—*M. barbatum* Benth. in DC. Prodr. X (1846) 583, non Waldst. and Kit.—*M. caucasicum* Boiss. Fl. or. IV (1879) 481. non Bge.—*lc.*: Beauv. l.c. 472, f. XIII.

538 Annual. Plant 15–40 cm tall, pubescent with white, erect, unicellular hairs. Stem branched above, branches short, erect or recurved, sparsely leafy. Leaves ovate-lanceolate or narrowly lanceolate, pubescent on both surfaces; lower leaves 3–3.5 cm long, 0.7 cm broad; upper leaves 5–6 cm long, 1–1.4 cm broad, all entire, rounded at base, sessile or with 1 mm long petioles, erect or slightly divergent. Flowers in dense, cylindrical-spicate, 3–7.5(10) cm long, 2–2.5 cm broad inflorescence. Bracts yellowish green, ovate-lanceolate or elongated-ovate, 3 cm long, 1.5 cm broad, flat, broadly cuneate at base, with a few teeth along margin and elongated, linear-oblong tooth at tip; upper bracts 1.5 cm long, 1 cm broad, with 7–9 mm long teeth. Calyx 1–1.4 cm long, with 4–6 mm long tube; tube subglabrous, with short, white, unicellular hairs only along veins; calyx teeth linear, long tapering, 7–8 mm long, elongated, erect or arcuate, puberulent along margin. Corolla light yellow or white, with 2 yellow spots, 2–2.1 cm long, villous inside and outside. Stamens with 3 mm long anthers, with unequal sharp appendages; lower 2 stamens longer than others. Ovary ovoid, 1.5 mm long, 1 mm broad, glabrous; style glabrous, 10 times as long as ovary. Capsule ovoid-lanceolate, 7–8 mm long, glabrous, unilaterally dehiscent; valve margins thickened, glabrous. Seeds oblong-ovoid, 3–6 mm long, 1.5 mm broad, opaque, dark cinnamon brown. May to June.

In mountains, in light pine forests, among scrub, on northern grassy slopes, in meadows and on pebble-beds, along river banks.—*Caucasus*: Ciscaucasia (Batalpashinsk), Dagestan, western, eastern and southern Transcaucasia. Endemic. Described from Khanlar. Type in Leningrad.

Series 2. *Caucasicae* Gorschk.—Calyx densely pubescent with long hairs, 2/5–1/2 as long as corolla. Capsule setose.

3. *M. caucasicum* Bge. in Mem. Acad. Sc. Petersb. 6 ser. VII (1858) 594; Boiss. Fl. or. IV, 481; Schmalh. Fl. II, 291; Soo in Fedde, Repert. XXIV, 136; Grossh. Fl. Kavk. III, 396.—*M. barbatum* Ldb. Fl.



Ross. III (1847–1849) 305, p.p., non Benth.: Schmalh. Fl. II, 292.—*Ic.*: Beauv. in Mem. Soc. Phys. Hist. Nat. Geneve, 28, 6, f. XXII.

Annual. Plant 20–40 cm tall, puberulent. Stem erect, simple or branched, branches long, spreading. Leaves coriaceous, ovate-lanceolate or narrowly lanceolate, 2.5–4.5(5) cm long, 0.6–1 cm broad, or 3–4 mm broad (subvar. *b. stenophyllum* Beauv.), or 1.5 cm broad (f. *latifolium* Gorschk.), long tapering at base, sessile, entire or subdentate. Flowers sessile, divergent in all directions, in sparse, 5–12 cm long, 3–5 cm broad, subcylindrical-spicate inflorescence. Bracts green or light-red, ovate-lanceolate; upper bracts broadly spatulate at end, not punctate, 1.5–2.5 cm long, 0.5–0.8 cm broad; lower bracts dentate at base, upper deeply cristate-dentate, teeth 6–7 mm long, all covered with white, minute, appressed hairs on both surfaces and along margin. Calyx 0.8–1.2 cm long; tube 4–6 mm long, glabrous at base, densely pubescent above with long, flat, multicellular, white or brown hairs; calyx teeth tapering deltoid, pointed or lanceolate-subulate, 4–6 mm long, green, equaling or slightly exceeding tube, long-ciliate along margin. Corolla light yellow or light-red, 2–3.2 cm long, with yellow or whitish ring below throat, densely covered with short, bicellular hairs, outside and with conical multicellular hairs inside. Anthers 2.5–3 mm long, with subequal sharp-pointed appendages. Ovary oblong, 2–3 mm long, 1.5 mm broad, glabrous; style 5–7 times as long as ovary, villous above on one side. Capsule elliptical-oblong, about 8 mm long, subfalcate, apiculate, densely pilose, 2-seeded, rarely 4-seeded, bilaterally dehiscent, valve margins thickened, rarely pilose. Seeds oblong-ovoid, 6 mm long, 1.5 mm broad, dark cinnamon brown. June to July (Plate XXVI, fig. 3).

In mountains (up to 2800 m), in oak forests, among scrub, on dry slopes, in subalpine meadows.—*Caucasus*: Dagestan, western Transcaucasia (Gagrinsk Range), eastern and southern Transcaucasia. Endemic. Described from Persati.

4. *M. alboffianum* Beauv. in Mém. Soc. Phys. Hist. Nat. Genève, 38, 6 (1916) 521; Grossh. Fl. Kavk. III, 396.—*M. caucasicum* Alboff, Prodr. Fl. Colch. (1895) 195, nomen. non Bge.—*M. caucasicum* Bge. ssp. *alboffianum* (Beauv.) Soo in Fedde, Repert. XXIV (1927) 136.—*M. grossheimii* K.-Pol. nomen in herb.—*Ic.*: Beauv. l.c. 418, 520, 521.

Annual. Plant 3–10(15) cm tall, densely covered throughout with white and sometimes rusty yellow multicellular hairs. Stem erect, simple or branched above. Leaves spaced, ovate-lanceolate or narrowly lanceolate, 2.5–3.5 cm long, 0.4–0.5 cm broad, acute; lower leaves elliptical-lanceolate, 1.2 cm long, 0.6 mm [sic], broad, obtuse, tapering toward base, with 1.5 mm long, puberulent petioles; all leaves sparsely puberulent on both surfaces. Flowers subsessile, in spicate ovoid-globose, 2–4.5 cm

long, 1.8–3 cm broad inflorescence. Bracts ovate-lanceolate, acute, green, somewhat light red, sparsely puberulent on both surfaces; lower bracts 2–3.2 cm long, 0.4 cm broad; upper and middle bracts 1.5 cm long, 1 cm broad; all bracts cuneate-tapering, entire or falcate-dentate at base, teeth 2–4 mm long. Calyx 8 mm long, tube 3.5 mm long, glabrous at base, somewhat densely hispid from middle, covered with bi-cellular hairs; calyx teeth deltoid, pointed, elongated, 5 mm long, slightly exceeding tube, covered with long, white, multicellular hairs. Corolla yellow or somewhat light red, 1.4–1.8 cm long, 2 times as long as calyx, densely covered outside with minute, conical, lanate hairs, inside with simple acrose hairs. Anthers 3 mm long, with sharply pointed, subequal appendages. Ovary oblong, 3 mm long, 1.5 mm broad, glabrous; style 4 times as long as ovary, hairy on one side above. Capsule oblong-ovoid, 6 mm long, 2–2.5 mm broad, cinnamon brown, with small acute beak, glabrous below, densely puberulent above. June to August.

In alpine zone, on stony slopes and in glades, among scrub, in meadows.—*Caucasus*: western Transcaucasia. Endemic. Described from Adzharia, Khino Mountains. Type in Geneva.

Series 3. *Euarvensia* Gorschk.—Calyx puberulent,  $2/3$  as long as corolla; capsule glabrous.

5. *M. arvense* L. Sp. pl. (1753) 605; M.B. Fl. taur.-cauc. II, 71; Benth. in DC. Prodr. X, 383; Ldb. Fl. Ross. III, 304; Boiss. Fl. or. IV, 480; Schmalh. Fl. II, 291; Soó in Fedde, Repert. XXIV, 130; Grossh. Fl. Kavk. III, 397.—*M. purpurascens* Gilib. Fl. lith. I (1781) 130.—*M. arvense* var. *purpurascens* (Gilib.) Litw. in Bull. Soc. Nat. Mosc. Nouv. sér. II (1889) 111.—*M. arvense* subsp. *schinzii* Ronnig. ap. Schinz and Keller. Fl. Suisse, ed. 3, I (1909) 580.—*M. schinzii* (Ronnig.) Stank. in Stank. and Tal. Opred. vyssh. rast. Evrop. ch. (1949) 823.—*M. arvense* subsp. *semlieri* Ronnig. and Pöevertl. in Allg. Bot. Zeitschr. XIII (1907) 179.—*M. semlieri* (Ronnig. and Pöevertl.) Stank. l.c.—Ic.: Hegi, Illustr. Fl. Mittel-Eur. VI, 1 tab. 241; Sorn. rast. SSSR, IV, fig. 416.—*Exs.*: Pl. Finl. exs. No. 942, 943; Fl. exs. Reipubl. Boh.-Slov. No. 472; Fl. Boh. and Morav. exs. No. 973.

Annual. Plant 15–50 cm tall, covered with minute, white often sparse, appressed hairs. Stem erect, cylindrical, branched; branches slender, projecting upward. Leaves lanceolate, 2–6(7) cm long, 5–8 mm broad, or broadly lanceolate, 1 cm broad, thick, somewhat fleshy (subvar. *schinzii* Beauv.), or linear, 2–5 mm broad (subvar. *semlieri* Beauv.), long acuminate, entire or with 2–4 long, acute teeth, subsessile or sometimes with 2 mm long petioles, covered on both surfaces with short white hairs. Flowers on 1 mm long pedicels, divergent in all directions, in long, dense, 3.5–10(14) cm long, 2–2.5 cm broad cylindrical-spicate inflorescence.

541 Bracts ovate-lanceolate, pinkish purple (1.7)2–2.5 cm long, 0.3–0.7 cm broad, almost equaling calyx or slightly longer, deeply cristate-dentate; teeth 3–8 mm long, long acuminate, sometimes with 2 rows of black or brown scaly points in lower part, secreting nectar, glabrous or sometimes puberulent and ciliate along margin. Calyx 1.2–2 cm long, generally densely pubescent; tube 6–8 mm long calyx teeth 0.6–1.4 cm long, linear barbate, subulate, often arcuate, almost equaling corolla tube. Corolla purple, 2–2.5(3) cm long, densely covered outside with white, 2-cellular, lanate hairs, inside with somewhat sparse, cylindrical, multicellular hairs; lower lip with yellow spots; corolla with white or pale sky-blue ring inside below throat. Anthers 4.5 mm long, with sharp-pointed, subequal or sometimes unequal appendages; appendages in lower anthers slightly longer than others. Ovary obovoid, 2 mm long, 1.2 mm broad, glabrous, cinnamon brown; style 5 times as long as ovary, glabrous or sometimes sparsely hairy above. Capsule obovoid, 0.8–1 cm long, 4–4.5 mm broad, 1/2–2/3 as long as calyx, with small curved beak, glabrous, dehiscent by 2 valves; valves thickened along margin, glabrous or rarely puberulent. Seeds oblong, 3–4.5 mm long, 1.5–2.5 mm broad, obtuse, dark cinnamon brown, opaque. May to September.

In mixed and oak forests, birch groves forest glades, in forest, forest-steppe and subalpine meadows. In mountains up to 1200–1500 m. Sometimes as weeds.—*European USSR*: Baltic Region, Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Trans-Volga Region, Upper Dniester, Bessarabia, Black Sea Region, Crimea, Lower Don, Lower Volga; *Caucasus*: Ciscaucasia, Dagestan, western, eastern and southern Transcaucasia; *Western Siberia*: Upper Tobol. *General distribution*: Scandinavia; Central Europe. Described from Western Europe. Type in London.

*Note*. Seeds have fleshy appendage, which attracts ants, who drag them to anthills, thus promoting distribution of this species (myrmecochory).

*Economic importance*: Seeds are similar in form, size, and in the initial stage, color, to wheat grain; later they darken. Mature seeds contain rinantine, which is poisonous to cattle. If mixed in large quantity with bread grains, they give an intensive violet color to the flour.

6. *M. argyrocomum* Fisch. ex Steudel. Nomencl. Bot. ed. 2, II (1841) 113.—*M. arvense*  $\beta$ . *bracteis florib. pallidis* M.B. Fl. taur-cauc. II (1808) 71; Lindem. Fl. Chers. II, 64.—*M. arvense*  $\beta$ . *argyrocomum* Fisch. in Ldb. Fl. Ross. III (1847–1849) 305.—*M. arvense*  $\beta$ . *argyrocomum* Fisch. in Hoffm. Herb. Viv. I (1825) 239, nom. nud.; C.A.M. Verz. Pflanz. Cauc. Casp. Meer, 107, nom. nud.—*M. arvense* ssp. *argyrocomum* (Fisch.) K.-Pol. in Tr. Vor. Gos. univ. II, 2 (1925) 261.—*M. arvense* var. *impunctatum* Godr. Fl. Lorr. III (1844) 233. *M. arvense* var. *albiflorum*



Čelak. Pr. Fl. Boh. (1881) 830.—*M. arvense* subsp. *pseudobarbatum* Schur. in Verhandl. Siebenbürg. Vereins IV (1853) 56, emend. Wettst. in Denkschr. Akad. Wissensch. LXX (1900) 332; Sorn. rast. SSSR, IV, 123.—*M. cretaceum* Czern. in Tr. Bot. sada, IX (1884) 79.—*Exs.*: GRF, No. 125; Herb. norm. No. 3067, 5304.

542 Annual. Plant 25–40 cm tall, puberulent with minute, white, generally sparse, appressed hairs. Stem 4-angled, cylindrical at base, branched, branches projecting. Leaves narrowly lanceolate, 2–4 cm long, 5–8 mm broad, long acuminate, entire or with 2–4 acute, long teeth, sessile or sometimes with 2 mm long petioles, puberulent on both surfaces. Flowers on 1 mm long pedicels, divergent in all directions, in sparse, cylindrical 2.5–8 cm long, 2–2.5 cm broad spicate inflorescence. Bracts oblong-ovate, 2 cm long, 0.5–0.7 cm broad, long acuminate, with elongated, 5–8 mm long teeth, ciliate along margin; upper bracts white or pale yellow; all bracts with 2 rows of black or brown dots in lower part. Calyx 0.6–1.5 cm long, white puberulent, with (2)4.5 mm long tube and linear-subulate, (0.4)1.1 cm long pointed teeth almost equaling corolla tube. Corolla pale yellow or almost white, 1.2–1.7 cm long, with lower lip equaling upper, white-villous outside, diffusely pilose inside. Anthers 3.5 mm long, with sharp-pointed subequal appendages. Ovary obovoid, 2 mm long, 1 mm broad, glabrous; style 8 times as long as ovary, glabrous or sometimes diffusely pilose above. Capsule obovoid, 6 mm long, 4 mm broad, falcate-recurved, 1–2 seeded, glabrous. Seeds oblong, 5–6 mm long, 2 mm broad, brown, smooth. June to July.

Needle-grass, herbaceous-mixed-grass and bushy steppe.—*European USSR*: Middle Dnieper, Volga-Don, Trans-Volga Region, Upper Dniester, Bessarabia, Black Sea Region, Crimea, Lower Don, Lower Volga; *Western Siberia*: Upper Tobol (Chkalovsk Province and Aktyubinsk River, at Karapasta). *General distribution*: Central Europe. Described from Saratov. Type in Leningrad.

*Note*. The typical steppe plant *M. argyrocomum* differs from *M. arvens* L. by having white or pale yellow bracts and a generally falcate-recurved corolla and capsule.

7. *M. elatius* Reuter in Bourg. exs. No. 1862 ex Boiss. Fl. or. IV, (1879) 480; Soó in Fedde, Repert. XXIV, 135; Grossh. Fl. Kavk. III, 397.—*M. arvense*  $\beta$ . *elatius* Boiss. l.c. 480.—*M. arvense* ssp. *elatius* Beauv. in Mém. Soc. Phys. Hist. Nat. Geneve, 38, 6 (1916) 524.—*M. arvense* ssp. *barbatum* (W. and K.) Beauv. var. *erivanicum* Beauv. l.c. 536.—*M. arvensis*  $\beta$ . *linifolium* C. Koch in Linnaea, XXII (1849) 679.—*l.c.*: Beauv. l.c. 446, f. VIII, 2.

Annual. Plant 30–60 cm tall, covered with white, sparse, erect, retrorse hairs. Stem 3 mm in diameter, branches generally slender,

elongated up to 25 cm, slightly divergent or sometimes suberect. Leaves narrowly lanceolate, (3)3.5–5 cm long, 0.5–1 cm broad, or linear, 2–3 mm broad (f. *linifolium* Beauv.), spaced, long acuminate, entire, subsessile, rarely with upto 2 mm long, petioles, covered on both surfaces with diffuse, white, short, appressed hairs. Flowers subsessile in long, spicate-cylindrical, 2.5–7.5 cm long, 1.5 cm broad, lax inflorescence. Bracts ovate-lanceolate, yellowish green, with somewhat dark-brown dots, 1.5–3 cm long, 1 cm broad, connivent, cristate-dentate at base, long acuminate above. Calyx 1–1.2 cm long, with 4 mm long tube, ciliate along veins and with 8 mm long aristate teeth ciliate along margin in lower part, pilulose above. Corolla 1.5–2 cm long, purple, pilose outside; lower lip with yellow lobes, lobes sometimes spotted. Anthers 4.5 mm long, with sharp-pointed, equal or sometimes unequal appendages. Ovary 2 mm long, 1 mm broad, glabrous; style 7 times as long as ovary. Capsule obovoid, 0.6–1 cm long, 4–4.5 mm broad, slightly shorter than calyx, glabrous, with small curved beak, with thickened valve margin, glabrous. Seeds whitish, 4 mm long, 1.5–2 mm broad, oblong, opaque. June to July.

In mountains, among scrub, in glades, to middle zone at 800–1800 m. —*Caucasus*: Ciscaucasia, western and southern Transcaucasia. *General distribution*: Asia Minor. Described from vicinity of Trabzon. Type in Leningrad.

Section 2. *Laxiflora* (Wettst.) Soo in Fedde, Repert. XXIV (1927) 146.—Sect. *Eumelampyrum* subsect. *Laxiflora* Wettst. in Pflanzenfam. IV, 3b (1895) 99.—Sect. *Obtusisepalum* Wettst. l.c. 99.—Flowers unilateral, in spicate, sparse, elongated, compound inflorescence.

Subsection 1. *Nemorosa* Soo in Javorka, Magyar Fl. (1925) 1007.—Bracts colored. Corolla yellow or pink, 1–1.5 cm long, with somewhat open mouth. Capsule bilaterally dehiscent.

Series 4. *Eunemorosa* Soo in Fedde, Repert. XXIV (1927) 146.—Corolla yellow. European plant.

8. *M. nemorosum* L. Sp. pl. (1753) 605; M.B. Fl. taur.-cauc II, 71; Benth. in DC. Prodr. X, 583; Ldb. Fl. Ross. III, 305; Boiss. Fl. or. IV, 481; Schmalh. Fl. II, 291; Soó in Fedde, Repert. XXIV, 146; Kryl. Fl. Zap. Sib. X, 2471.—*M. coerulescens* Gilib. Fl. lith. I (1781) 131.—*M. coeruleum* Gleditsch. Reise, I (1787) 424.—*M. moravicum* H. Braun in Oesterr. Bot. Zeitschr. XXXIV (1884) 422.—*M. nemorosum* subsp. *moravicum* (H. Braun) Rönning. in Vierteljahrschr. Naturf. Gesellsch. in Zürich. IV (1910) 314.—*M. nemorosum* var. *latifolium* Neilreich subvar. b) *moravicum* Beauv. in Mém. Soc. Phys. and Hist. Nat. Genève, 38, 6 (1916) 559.—*M. nemorosum* var. *stiriaceum* Beauv. and f. *nanum* and f. *microphyllum* Beauv. l.c. 557, 558.—*M. nemorosum* subsp. *typicum* Ganesch. in Tr. Bot. muz. XVI (1916) 123.—*M. nemorosum* subsp. *zingeri* Ganesch. l.c. 124.—*M. nemorosum* var.

(morpha) *angustifolium* Ganesch. l.c. 124.—*l.c.*: Fedtsch. and Fler. Fl. Evrop. Ross. 870. fig. 827; Syreistsch. Ill. fl. Mosk. gub. III, 172; Hegi. Illustr. Fl. Mittel-Eur. VI, 1, tab. 241; Ganeschin l.c. tabl. 12; Beauv. l.c. f. XXVI.—*Exs.*: GRF, No. 2560; Pl. Finl. exs. No. 944, 1340; Fl. pol. exs. No. 471; Fl. Boh. and Morav. exs. No. 682; Fl. lith. exs. No. 76; Herb. norm. No. 877, 2243; Herb. Fl. Ingr. No. 474; Fl. exs. Reipubl. Boh.-Slov. No. 479.

Annual. Plant 15–50 cm tall, puberulent with multicellular white hairs. Stem erect, generally branched, with elongated and somewhat spreading branches, covered with recurved white hairs; hairs short in lower part, denser and longer above. Leaves narrow, ovate-lanceolate, 3–5(10) cm long, 0.5–2(4) cm broad, long acuminate; base rounded-cordate, truncate or generally narrowed into 1–2 mm long petiole, entire, rarely with auricles and 1–2 teeth at base, subglabrous above, diffusely pilose beneath. Flowers on 1 mm long pubescent pedicels, singly in bract axils, unilateral, in 7–17 cm long, 2–2.5 cm broad lax spicate raceme. Bracts connivent, opposite, ovate-cordate or ovate-lanceolate, 1–3 cm long, 0.6–1.8 cm broad, lanceolate-acuminate, bluish violet, cristate-dentate along margin, with lanceolate-subulate, long and slender acuminate, 1–3 mm long teeth, very rarely entire, pubescent at base and covered along veins with long, multicellular, white hairs. Calyx 0.8–1 cm long, villous-lanate, with 4–5 mm long tube; calyx teeth lanceolate-subulate, 4–5 mm long, 1 mm broad, slender, long acuminate, patent, pubescent along veins and margin with long, white, multicellular hairs. Corolla bright yellow, 1.2–2 cm long, with reddish curved tube, villous outside, sparsely pilose inside; upper lip slightly shorter than lower, bright purple lip. Anthers 3.3 mm long, with sharp-pointed unequal appendages. Ovary glabrous, 2 mm long, 1 mm broad; style 6 times as long as ovary, pilose above. Capsule oblong or elliptical-lanceolate, 0.6–0.7(1) cm long, 4–4.5 mm broad, pointed, glabrous, bilaterally dehiscent, valve margins thickened, smooth. Seeds 5–6 mm long, 1.5–1.8 mm broad, blackish. May to September.

In deciduous forests, along forest edges, among scrub; in moist, marshy and turfy meadows and along calcareous slopes.—*European USSR*: Karelia-Lapland, Dvina-Pechora, Baltic Region, Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Upper Dniester, Bessarabia, Black Sea Region, Lower Don; *Eastern Siberia*: Angara-Sayan (in vicinity of Irkutsk, 40 km along road to Kultuk. Introduced. Reported by M.G. Popov). *General distribution*: Scandinavia, Central Europe, Western Mediterranean Region. Described from northern Europe. Type in London.

- 545      9. *M. polonicum* (Beauv.) Soó in Fedde, Repert. XXIII (1926) 163, nom. nud.; XXIV (1927) 156.—*M. nemorosum* ssp. *nemorosum* Beauv. var. *polonicum* Beauv. and f. *depauperatum* Beauv. in Mém. Soc.



Phys. Hist. Nat. Genève, 38, 6 (1916) 555.—*M. nemorosum* ssp. *typicum* Ganesch. var. *angustifolium* Ganesch. in Tr. bot. muz, XVI (1916) 124.

Annual. Stem 30–70 cm tall, sparsely covered with white, appressed hairs or sometimes subglabrous, simple or branched, branches elongated. Leaves elliptical-lanceolate or lanceolate; 6 cm long, 0.6–1.5 cm broad or broader, 1.5–2.5 cm (f. *galianum* Soo), or narrower, linear or linear-lanceolate, 2–4 cm long, 0.2–0.5(0.6) cm broad (var. *angustifolium* Ganesch.), long acuminate, somewhat connivent, glabrous or sparsely hairy above, hispid or sometimes densely pilose beneath. Flowers subsessile or on 1 mm long pedicels, unilateral, in 9 cm long, 1 cm broad lax spicate raceme. Bracts lanceolate, 1.5–9 cm long, 1–1.7 cm broad, deeply dentate, bluish violet, sparsely pilose. Calyx 8.5–9 mm long; tube 3–3.5 mm long, glabrous or short- or long-ciliate along veins; calyx teeth narrow, lanceolate, spreading, 5.5 mm long, with short or long, 3–4-cellular, white hairs along margin. Corolla 1.3–1.8 cm long. In other respects, similar to *M. nemorosa* (*nemorosum*) L. June to July.

In forests and among scrub.—*European USSR*: Baltic Region, Ladoga-Ilmen, Upper Volga, Middle Dnieper. *General distribution*: Central Europe (eastern part). Described from Lvov Region. Type in Geneva.

Series 5. *Rosea* Soó in Fedde, Repert. XXIV (1927) 163.—Corolla pink or red, violet when dry. Asian plant.

10. *M. roseum* Maxim. Prim. Fl. Amur. (1859) 210; Kom. Fl. Manchzh., III, 438; Kom. and Alis. Oprod. rast. Dalnevost. kr. II, 929; Soó in Fedde, Repert, XXIV, 161.—*M. iedoense* Miq. in Ann. Mus. Lugd.-Bat. II (1865) 122.—*M. roseum* ssp. *euroseum* Beauv. in Mém. Soc. Phys. and Hist. Nat. Genève, 38, 6 (1916) 546.—*M. roseum* var. *typicum* Fr. and Sav. Enum. pl. jap. II (1875) 461.—*M. roseum* var. *setaceum* Maxim. f. *latifolium* Beauv. l.c. 547, non Nakai.—*l.c.*: Kom. and Alis. l.c. tabl. 277; Beauv. l.c. 545.

Annual. Plant (17)35–60 cm tall, hispid, sparsely covered with white, unicellular hairs. Stem angular, erect, branched, branches suberect or arcuate. Leaves lanceolate or ovate-lanceolate, acuminate, 4–6 cm long, 1.2–1.5(2.5) cm broad, or 5–8 mm broad (f. *beauverdii* Soo), rounded or hastate-cordate at base, with 5–8 mm long petioles, spreading, entire. Flowers numerous, on 1 mm long pedicels, unilateral, in interrupted inflorescence, 5–13 cm long, 1.5 cm broad. Bracts green or somewhat purple, 546 ovate or oblong, 2 cm long, 1 cm broad; lower bracts entire or sometimes subdentate, upper generally long subulate-dentate, teeth 1–2 mm long, twisted, spaced. Calyx 3 mm long; tube 1.5 mm long, pubescent, or asperate or long-ciliate along veins, covered with multicellular white hairs (var. *hirsutum* Beauv.) and with deltoid-lanceolate teeth, almost

equaling or slightly exceeding tube, acute or subulate-acuminate, sub-falcate. Corolla 1.5 cm long, dark pink, diffusely puberulent; upper lip short, compressed, entire; lower lip scarcely longer, 3-lobed, all lobes orbicular, middle slightly smaller than others. Anthers 3.5 mm long, with minute, subequal, sharply pointed appendages. Ovary ovoid, 2 mm long, 1 mm broad, glabrous; style 7 times as long as ovary, glabrous. Capsule elliptical-lanceolate or ovoid, 0.8–1 cm long, 3.5–5 mm broad, apiculate, falcate-arcuate, glabrous at base, densely white-puberulent from middle; valve margin covered with white acerate hairs. Seeds light brownish yellow, 4–5 mm long, 1–1.3 mm broad, oblong, smooth. July to August (Plate XXVI. fig. 1).

In deciduous and mixed forests; in forest mixed-grass and sedge-reedgrass meadows and as weed in pastures, near cultivated fields and roads.—*Soviet Far East*: Ussuri, Zeya-Bureya. *General distribution*: China, Japan. Described from Khaitso (Ussuri River Basin). Type in Leningrad.

11. *M. setaceum* (Maxim.) Nakai in Tokyo Bot. Mag. XXIII (1909) 9.—*M. roseum* var. *setaceum* Maxim. ex Palibin in Tr. Bot. sada, XVIII (1900) 22.—*M. setaceum* var. *genuinum* Nakai, l.c. 9.—*M. roseum* Maxim. ssp. *euroseum* Beauv. var. *y. setaceum* maxim. f. *genuinum* Beauv. in Mém. Soc. Phys. Hist. Nat. Genève, 38, 6 (1916) 547.—*M. setosum* Kom. in Kom. and Alis. Oprod. rast. Dalnevost. kr. II (1932) 929, non Nakai.—*lc.*: Hayek in Denkschr. Akad. Wiss. Wien, XCIV, tab. 7, fig. 9.

Annual. Plant 30–45 cm tall, sparsely covered with short, white, unicellular, somewhat appressed hairs. Stem erect, angular, generally densely hispid, branched, sometimes branches densely crowded (f. *congestum* Nakai); branches slender, erect or sometimes arcuate. Leaves linear-lanceolate, 2–6 cm long, 1.5–3 mm broad, or lanceolate-linear and sometimes almost ovate, 5–8 mm broad (*β. latifolium* Nakai), acuminate, entire at base, hastate-falcate, with 2–5 mm long petioles, spreading, glabrous or hispid along margin. Flowers numerous, on 1 mm long pedicels, generally unilateral, in interrupted, 2.5–4.5 cm long, 1.5–2 cm broad spicate inflorescence. Bracts green or pink, lanceolate-linear, sometimes almost ovate (*β. latifolium* Nakai), acute, 1.3–2.2 cm long, 1.5–2 mm broad, setose-dentate, setae 5–6 mm long, spreading. Calyx 3–5 mm long, with 1.5–2.5 mm long, white-puberulent tube and linear, subulate, 1.5–2.7 mm long teeth; upper teeth longer than lower, all puberulent along margin. Corolla pink, 0.6–1.2 cm long, puberulent, with 7–8 mm long tube; upper lip equaling lower or slightly shorter, densely barbate along margin; lower lip 3-lobed above, lobes ovate or oblong, equal. Anthers 3.5 mm long, barbate at base, with subequal, sharp-pointed appendages. Ovary ovoid, 2 mm long, 1.2 mm broad,

glabrous; style slender, 7 times as long as ovary, smooth, curved above. Capsule ovoid-lanceolate, 5–7 mm long, 4 mm broad, apiculate, slightly setose, smooth at base; valve margins pubescent with spiniform hairs. Seeds oblong, 4–5 mm long, 1–1.3 mm broad, brownish, smooth. July.

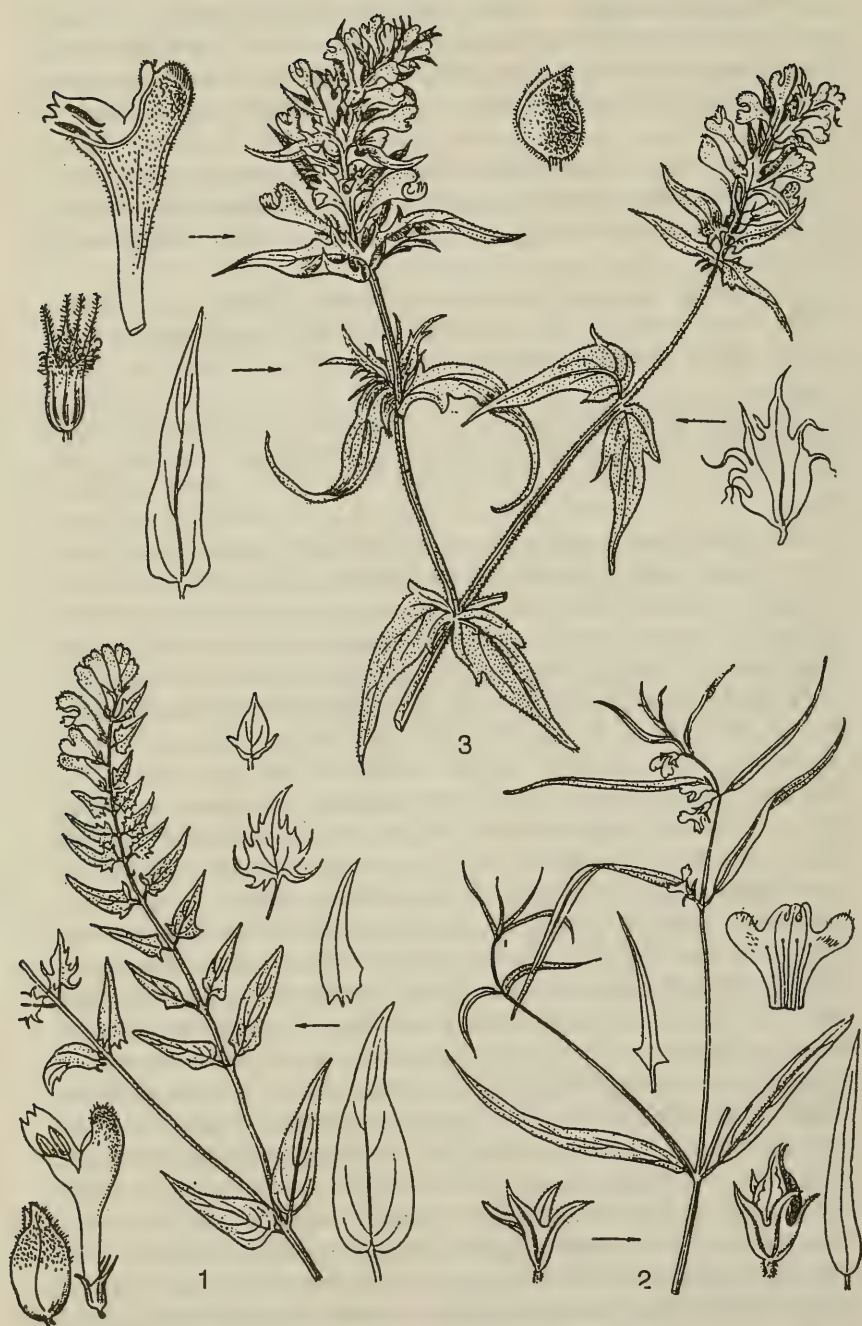
In oak forests, in logging areas, in pine and oak forests on mud cones, among scrub along river banks. *Soviet Far East*: Ussuri, Zeya-Bureya. *General distribution*: China, Korea, Japan. Described from Seoul. Cotype in Leningrad.

Subsection 2. *Silvatica* Soo in Javorka, Magyar. Fl. (1925) 1009.—Bracts green. Corolla generally yellow, 0.8–1 cm long, with open mouth. Capsule bilaterally dehiscent.

12. *M. silvaticum* L. Sp. pl. (1753) 605; Benth. in DC. Prodr. X, 584; Ldb. Fl. Ross. III, 306; Boiss. Fl. or. IV, 482; Schmalh. Fl. II, 292; Soó in Fedde, Repert. XXIV, 167; Kryl. Fl. Zap. Sib. X, 2473.—*M. hyans* Gilib. Fl. lith. I (1781) 131; Exerc. Phyt. I (1792) 131.—*M. silvaticum* ssp. *intermedium* Ronnig. and Schinz in Schinz and Keller, Fl. Suisse, ed. 3, I (1909) 521.—*M. intermedium* (Ronnig.) Stank. in Stank. i Tal. Opred. vyssh. rast. Evrop. ch. (1949) 823.—*M. silvaticum* ssp. *aestivale* Ronnig. ap. Schinz and Keller, l.c. 521.—*M. aestivale* (Ronnig.) Stank. l.c.—*l.c.*: Hegi, Illustr. Fl. Mittel-Eur. VI, 1, tab. 241; Beauv. in Mém. Soc. Phys. Hist. Nat. Genève, 38, 6, 577, f. XXVIII.—*Exs.*: GRF, No. 331; Herb. Fl. Ingr. No. 476; Pl. Finl. exs. No. 947, 948, 1341; Fl. pol. exs. No. 664<sup>a</sup>, 665<sup>b</sup>.

550 Annual. Plant (8)10–40 cm tall, subglabrous or sparsely covered with short, white, retrorse hairs. Stem glabrous or pubescent, simple, erect, or branched, with erect, long, recurved branches. Leaves elliptical, 3–7 cm long, 0.4–1 cm broad or 1–1.2 cm broad (f. *latifolium* Hartm.) or linear-lanceolate, 2–3 mm broad (f. *angustifolium* Hartm.), long acuminate, entire, subsessile or with 1 mm long petioles, glabrous or sparsely white-puberulent on both surfaces and ciliate along margin. Flowers on pubescent pedicels, singly in upper leaf and bract axils, in unilateral, spicate, 1.5–11 cm long, 0.8–1.5 cm broad lax raceme. Bracts similar in shape to leaves, lanceolate or linear-lanceolate, 2–6 cm long, 3–7 mm broad, entire, or upper bracts with 1–2 short, ovate-lanceolate, spreading, acute teeth at base. Calyx 4–7 mm long, pubescent, with 2–3 mm long tube; calyx teeth ovate-lanceolate, acute, 2–4 mm long, spreading, puberulent along veins and margin. Corolla golden or dark yellow, 0.8–1 cm long, with strongly curved tube; upper lip equaling lower. Anthers 1–1.5 mm long, with equal sharp-pointed appendages. Ovary elliptical, 1.5–2 mm long, 1 mm broad; style 4–5 times as long as ovary, glabrous. Capsule elliptical-lanceolate or ovoid, apiculate, suberect, 7–8 mm long, 4.5 mm broad, almost equaling calyx, cinnamon brown, glabrous, with thickened,





glabrous valve margins. Seeds oblong, 5–6 mm long, 2 mm broad, smooth, brownish. June to August (Plate XXVI, fig. 2).

In coniferous and mixed forests, among scrub along banks of rivers and lakes, in forest meadows and marshes.—*Arctic Region*: Arctic Europe; *European USSR*: Karelia-Lapland, Dvina-Pechora, Baltic Region, Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnieper. *General distribution*: Scandinavia, Central Europe, Western Mediterranean Region, Balkan States-Asia Minor. Described from Western Europe. Type in London.

*Note*. S.S. Stankov (Stank. and Tal. l.c. 823) considers the Ural mountains as the possible locality of *M. laricetorum* Kern. It is difficult to agree with him, since this species is the same as *M. carpaticum* Schult., distributed in mountainous regions of Scandinavia, Central Europe and the Balkan States.

13. *M. herbichii* Woloszczak. Spraw, Kom. Fiz. XXI (1887) 133; M.G. Popov. Oчерk. rast. i fl. Karpat, 234.—*M. silvaticum* ssp. *herbichii* (Woloszczak.) Soo in Fedde. Repert. XXIV (1927) 174.—*M. silvaticum* ssp. *saxosum* (Baumg.) var. *herbichii* Beauv. in Mém. Soc. Phys. Hist. Nat. Genève, 38, 6 (1916) 582.

551 Annual. Plant 12–25 cm tall, white-pubescent. Stem erect or branched; branches slender, erect, somewhat appressed; stem and branches pubescent with long, white, generally recurved hairs. Leaves linear-lanceolate, 3 cm long, 0.5–0.6 cm broad, acuminate, appressed-puberulent on both surfaces and along margin, with 1–1.5 mm long petioles. Flowers few, on 1.5 mm long puberulent pedicels, singly in unilateral, very sparse, spicate inflorescence, 3–11 cm long, 1.5–2 cm broad. Bracts green, linear-lanceolate, 0.8–2.7 cm long, 1.5–4 mm broad, long acuminate, narrowed into 1 mm long petioles, entire, or upper bracts with 1 small, lanceolate, acute tooth at base on each side. Calyx 5 mm long, pubescent, with 2.5 mm long tube and lanceolate-aristate, 2.5 mm long teeth. Corolla bright yellow, 0.8–1.2 cm long, lower lip light-red, spotted, pink or brownish in mature flower; tube broadened, throat open. Anthers 2.5 mm long, with equal sharply pointed appendages. Ovary ovoid, 1.5 mm long, 1 mm broad, smooth; style slender, 6 times as long as ovary, glabrous. Capsule elliptical-lanceolate, 9 mm long, slightly exceeding calyx, with rostrate mucro, glabrous, with thickened valve margins. Seeds oblong, cinnamon brown, 5–6 mm long, 2 mm broad. June to August.

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Plate XXVI.

1. *Melampyrum roseum* Maxim., upper portion of plant, flower, leaf, capsule, bract.—2. *M. silvaticum* L., upper portion of plant, capsule, corolla, calyx, bract, leaf.—3. *M. caucasicum* Bge., upper portion of plant, calyx, corolla, capsule, bract, leaf.

*European USSR*: Upper Dniester (eastern Carpathian Range; Rakhov, Menchul Mountain; Mukachev Sector, Pikui Mountain). *General distribution*: Central Europe (north eastern Carpathians, Transylvania). Described from Carpathian mountains. Type in Cracow.

14. *M. saxosum* Baumg. Enum. Stirp. Trans. II (1861) 199; M.G. Popov, Ocherk. rast. i fl. Karpat, 233.—*M. silvaticum* ssp. *saxosum* (Baumg.) Beauv. in Mém. Soc. Phys. Hist. Nat. Genève, 38, 6 (1916) 581.—*Exs.*: Herb. norm. No. 1842; Fl. pol. exs. No. 472; Fl. exs. austrohung. No. 629.—*lc.*: Hegi, Illustr. Fl. Mittel-Eur. VI, I, 77, f. 45 d, e.

Annual. Plant 10–35 cm tall, glabrous. Stem simple or branched. Leaves lanceolate, 3 cm long, 0.3–1 cm broad, with 2 mm long petioles, glabrous, acuminate. Flowers numerous on glabrous, 1.5 mm long pedicels, in unilateral, 3.5–7 cm long, sparse raceme. Bracts linear-lanceolate or lanceolate, 2.5–4(5) cm long, 0.5–0.7 cm broad, long-acuminate; lower bracts entire, upper with 1–2 small, ovate-lanceolate, acute, spreading teeth at base. Calyx 5–6 mm long, pubescent, with 2.5–3 mm long tube and with ovate-lanceolate, 2.5–3 mm long, acute, spreading teeth, puberulent along veins and margin. Corolla milk-white, 0.8–1.2 cm long; lower lip with 5 dark-red or violet stripes or with 3 stripes and 2 orange spots; throat open, tube curved. Anthers 2.5 mm long, with equal mucronate appendages. Ovary ellipsoid, 2.5 mm long, 1.5 mm broad, glabrous; style 3–4.5 times as long as ovary. Capsule elliptical lanceolate, 4.5–6 mm long, 2–2.5 mm broad, equaling calyx or slightly  
552 shorter, acute, suberect, glabrous, with thickened, glabrous valve margin. Seeds oblong, 5 mm long, 2 mm broad, dark brown. June to August.

In mountains, glades, among dwarf growth.—*European USSR*: Upper Dniester (mountains along Upper Tissa in Gutsulshina: Marmarosh, Pop-Ivan, Stog Mountains). *General distribution*: Central Europe (northeastern and eastern Carpathian mountains). Described from Transylvania. Type in Vienna.

Subsection 3. *Pratensia* Soc in Javorka, Magyar. Fl. (1925) 1609.—Bracts green. Corolla yellow or golden-yellow, 1.4–1.8 cm long, with closed throat. Capsule unilaterally dehiscent.

15. *M. pratense* L. Sp. pl. (1753) 605; Benth. in DC. Prodr. X, 583; Ldb. Fl. Ross. III, 306; Boiss. Fl. or. IV, 482; Schmalh. Fl. II, 291; Soo in Fedde, Repert. XXIV, 176; Kryl. Fl. Zap. Sib. X, 2472.—*M. vulgatum* Pers. Synops. II (1807) 151.—*M. pratense* ssp. *vulgatum* (Pers.) Ronnig. in Vierteljahrsschr. Naturf. Gesellsch. in Zürich LV (1910) 321.—*M. pratense* ssp. *vulgatum* var. *vulgatum* Beauv. in Mém. Soc. Phy. Hist. Nat. Genève, 38, 6 (1916) 502.—*M. pratense* var. *vulgatum* Beck. Fl. Nied. Oesterr. (1893) 1096.—*M. hastatum* Gilib. Fl. lith. I (1781) 131. *Marinella vulgaris*



Bubani, Fl. Pyr. (1897) 202.—*l.c.*: Syreistsch. Ill. fl. Mosk. gub. III, 173; Beauv. *l.c.* 418 and 477; Hegi. Illustr. Fl. Mittel-Eur. VI, 1, tab. 244; Sturm, Fl. Deutschl. ed. 2, X, 188.—*Exs.*: Herb. Fl. Ingr. No. 475, 475<sup>b</sup>; Pl. Finl. Exs. No. 945, 946; Fl. pol. exs. No. 665; Herb. norm. No. 1841, 4748, 4749; Fl. exs. austro-hung. No. 630, 631, 3698.

Annual. Plant 15–30(60) cm tall. Stem glabrous or pubescent in upper part with sparse, short, white retrorse hairs, erect, simple or branched, with 1–2 pairs of slender branches. Leaves ovate-lanceolate or linear-lanceolate, 4–9 cm long, 0.5–1.2 cm broad or 0.3 cm broad (var. *sibiricum* Beauv.), long-acuminate, entire or upper leaves sometimes sparsely dentate at base, narrowed into 1–1.5 mm long petiole or sessile, glabrous or diffusely pilose on both surfaces, covered with short rigid ciliae along margin. Flowers on 1–2 mm long glabrous pedicels, erect, later horizontally unilaterally divergent, in sparse, 2–7 cm long, 1 cm broad racemose inflorescence. Bracts similar to leaves in shape, ovate-lanceolate or linear-lanceolate, 1.7 cm long, 0.4 cm broad; lower bracts rounded at base, entire or slightly sinuate-dentate; upper bracts cuneate at base, with 1–2 or several subulate-linear teeth or all bracts entire (var. *integerrimum* Doell.). Calyx 7 mm long, subglabrous, with 3 mm long tube, sometimes sparsely pilose along veins (var. *sibiricum* Beauv.) and with linear-subulate teeth; teeth tapering upward, subequal, 4(5) mm long, shorter than corolla tube, sparsely hirtellous along margin. Corolla 1.5–2.5 times as long as calyx, lemon-yellow, white, brownish or yellowish at first, later light pink with purple stripes (var. *purpurascens* Aschers.) with erect white tube with somewhat closed throat; lower lip slightly diverging from upper flattened lip. Anthers 2.5 mm long, with unequal mucronate appendages; lower anthers longer. Ovary ovoid, 2–3 mm long, 1.5 mm broad, glabrous; style 3 times as long as ovary, curved above, smooth. Capsule ovoid, 0.8–1 cm long, 0.4–0.5 cm broad, slightly longer than or  $1\frac{1}{3}$  times as long as calyx, glabrous, obliquely apiculate, dehiscence fissure glabrous. Seeds oblong, 5.5–6 mm long, 2.5 mm broad, smooth. May to July.

In tundras, coniferous, deciduous and mixed forests, glades, marshy and mixed-grass meadows in forests, fontinal, sphagnous marshes, along banks of lakes and sea coasts.—*Arctic Region*: Arctic Europe; *European USSR*: Karelia-Lapland, Dvina-Pechora, Baltic Region. Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnieper (single locality), Middle Dnieper (rare), Volga-Don, Black Sea Region (Novomoskovskii Region, Degatovo), Lower Don (single locality); *Western Siberia*: Ob' Region, Altai Mountains (Naryn); *Eastern Siberia*: Yenisey, *General distribution*: Scandinavia, Central and Atlantic Europe, Western Mediterranean Region (northern Italy), Balkan States-Asia Minor (Yugoslavia, Bulgaria). Described from Western Europe. Type in London.

16. *M. laciniatum* Koshewn. and Zing. in Bull. Soc. Mosc. LVI, 9 (1881) 313, 328; Maevsk. Fl. 7th ed. 652.—*M. pratense* var. *laciniatum* (Koshewn. and Zing.) Schmalh. Fl. II (1897) 292.—*M. pratense* L. ssp. *vulgatum* (Pers.) Beauv. var. *vulgatum* Beauv. subvar. *digitatum* Schur. f. *laciniatum* (Koshewn. and Zing.) Beauv. in Mém. Soc. Phys. Hist. Nat. Genève, 38, 6 (1916) 508.—*M. pratense* ssp. *vulgatum* (Pers.) Soo in Fedde. Repert. XXIV (1927) 177, non Ronnig.—*l.c.*: Koshewn. and Zing. l.c. tab. III.

Annual. Plant 25–35 cm tall, glabrous. Stem angular, simple or branched, branches long, slender. Leaves oblong-lanceolate or elongated lanceolate, 5.75 cm long, 0.7–2 cm broad, acuminate, with 1–2 mm long petioles. Flowers subsessile or on 1–2 mm long, glabrous, erect pedicels, generally divergent at anthesis, in sparse racemose, 8 cm long, 2 cm broad unilateral inflorescence. Bracts ovate, 1–7(3) cm long, 1.2 cm broad, subcordate at base, tapering, deeply parted or cristate-incised into 5–9 lanceolate-linear, long lobes; lower bracts with lanceolate mucronate tip, 0.5–2 cm long, parted at base, with 0.5 cm long lobes; middle and upper bracts stellate, 1–1.5 cm long, with lateral lobes slightly shorter than or almost equaling middle lobe. Calyx 5–7 mm long, glabrous, 1/2 as long as corolla, with 2–3 mm long tube and lanceolate, 3–4 mm long teeth almost equaling tube, acute; upper teeth slightly longer than lower. Corolla 1–1.3 cm long, yellow or almost white, with erect white tube.

554 Anthers 2.5 mm long, with unequal mucronate appendages, lower longer than others. Ovary ovoid, 2 mm long, 1 mm broad, glabrous; style 5 times as long as ovary, smooth. Capsule ovoid-lanceolate, 0.8–1 cm long, 0.5 cm broad, glabrous, with recurved beak. Seeds oblong, 4 mm long, 2 mm broad, cinnamon brown. June to July.

In coniferous and mixed forests (rare).—*European USSR*: Upper Volga, Upper Dnieper, Volga-Don, Trans-Volga Region, Endemic. Described from Tula Province (vicinity of the city of Alexin). Type in Moscow.

### Genus 1350. *TOZZIA*<sup>1, 2</sup> L.

L. Sp. pl. (1753) 607.

Calyx campanulate, obscurely bilabiate, almost 5-toothed. Corolla with narrow-infundibuliform tube and 5 obtuse lobes, obscurely bilabiate, yellowish, with purple spots on lower lip; upper lip deeply bilobed, lower deeply 3-lobed with almost similar obtuse lobes. Stamens 4, included, fruit unilocular, 1-seeded.

<sup>1</sup> Treatment by B.K. Schischkin.

<sup>2</sup> Named after professor in Rome, L. Tucci (1633–1717).

This genus includes 2 species, distributed in mountains of Central Europe and in Carpathian mountains.

1. *T. carpathica* Woloszcz. in Spraw. Kom. fizyogr. Akad. Krakow, XXVII, 2 (1892) 148 and 217.—*T. alpina* auct. Galic. and Hung. non L.—*Exs.*: Fl. pol. exs. No. 473; Fl exs. austro-hung. No. 3696.

Perennial. Rootstock reduced, with numerous roots. Stems single or several, 15–25 cm tall, branched almost from base, with obliquely upturned branches, glabrous or with scarcely discernible stripe of short hairs on one side of internodes on main stem and branches. Lower leaves lanceolate or oblong, 5–7 mm long, 1–2.5 mm broad, generally recurved, alternate; middle cauline leaves usually opposite, broadly ovate, 10–20 mm long, 5–10 mm broad, subobtuse, entire or with few teeth along lower half of margin, sessile, rounded or cordate at base. Flowers 2 in leaf axils, terminal on stems and branches, on filiform, 2–6 mm long pedicels, Calyx 2 mm long. Corolla 5–6 mm long. Anthers pointed at base. Capsule globose, about 2 mm long. May to June.

In shady, moist, sometimes stony places in mountain zone at 1000 m altitude.—*European USSR*: Upper Dniester (eastern Carpathian mountains). *General distribution*: Hungary. Described from Carpathian mountains. Type in Cracow.

*Note*. This species is very close and difficult to distinguish from *T. alpina* L.

### Genus 1351.—*PHTHEIROSpermum*<sup>1, 2</sup> Bge.

Bge. in Fisch. and Mey. Ind. sem. hort. Petrop. I (1835) 35.—*Emmenospermum* C.B. Clarke ex Hook. Fl. Brit. Ind. IV (1883–1884) 249, 304.

Flowers axillary, solitary, ebracteolate. Calyx campanulate, 5-partite, with subequal lobes, pinnately dentate. Corolla bilabiate, tube broadened above; upper lip very short, erect, bilobed, lobes recurved; lower lip longer than upper, 3-lobed, with 2 hollow, longitudinally stretching palates at base; throat open. Stamens 4, included within upper corolla lip, didynamous, lower stamens longer; anthers glabrous, with parallel or weakly diverging locules, mucronate at base; filaments broadened at base, densely pilose. Stigma with 2 very short spatulate lobes. Capsule compressed, rostrate, bilocular, 2-valved, dehiscing by longitudinal fissures passing along valves of each locule; septum wall consisting of 2 semi-partitions freely converging in middle of capsule. Seeds numerous, ovate-angular, coat obscurely reticulate or almost smooth. Annuals or biennials,

<sup>1</sup> Treatment by V.F. Golubkova.

<sup>2</sup> From the Greek *phtheir*—louse and *sperma*—seed.



simple or branched herbs, somewhat viscid-pubescent. Leaves opposite, pinnatipartite or partite.

This genus includes 6 species, distributed in Central and Eastern Asia.

1. *P. chinense* Bge. in Fisch. and Mey. Ind. sem. hort. Petrop. I (1835) 35; DC. Prodr. X, 539; Maxim. Prim. Fl. Amur. 208; Kom. Fl. Man'chzh. III, 440; Kom. and Alis. Oprod. rast. Dalnevost. kr. II, 929.—*lc.*: Beih. Bot. Centralbl. XXXVII, II, tab. 9.—*Exs.*: GRF, No. 2364.

Annual or biennial. Plant glandular-pubescent throughout. Root branched at neck. Stem 7–80 cm tall, generally single, branched, with obliquely ascending or slightly appressed branches or simple, pubescent, more densely above, with long-stalked glandular hairs. Leaves 1–5 cm long, 0.5–5 cm broad, ovate-deltoid in outline, pinnatipartite in lower part, pinnatifid in middle of lamina, upper lobes gradually merging, connate, 556 transforming into pinnate-dentate tip; lobes of leaves ovate or lanceolate, unequally bidentate, usually lower lobes slightly unequal-sided (teeth larger along lower lobe margins), lower pair of lobes of lower leaves 14–25 mm long, 7–12 mm broad, with 2–4 mm long petioles; leaves pubescent on both surfaces, more densely beneath along veins, with long-stalked glandular hairs. Flowers at branch ends in upper leaf axils on about 1 mm long, glandular-pubescent pedicels. Calyx 5–13 mm long, campanulate, cleft up to middle or more into 5, rarely 6, somewhat unequal, oblong lobes, upper half part (or more) with pinnately dentate lobes (with 2–5 small teeth on either side), ribbed, with whitish tube, pubescent outside and along veins with long-stalked glandular hairs, inside with simple hairs in upper part of tube; lobes pubescent with glandular and scattered simple hairs. Corolla pink with 2 yellow spots in throat, 2.5–3 times as long as calyx, with 7–10 mm broad inflated tube, limb short, 1/6–1/5 as long as tube; upper corolla lip bilobed, with very short broad lobes; 3 lobes of lower lip oblong-orbicular, 3–4 mm long, 2.5–3 mm broad; corolla puberulent outside with scattered glandular and simple hairs, pilulose inside on lobes of both lips; hairs longer and denser on lower lip inside throat, mainly along palates. Stamens inserted in corolla tube, slightly above base; anther chambers parallel or slightly diverging in lower part, with few long hairs along margin of dehiscence cleft. Style included, equaling lower stamens, sparsely pubescent with short, setiform, obliquely antrorse hairs, mixed with glandular hairs in lowermost part. Capsule 7–13 mm long, 3–7 mm broad, flattened, oblong-ovate, narrowed above, tapering into small beak, curved on side, pubescent in upper part, more densely along margin, with patent long-stalked hairs, mixed with few glandular hairs, with simple hairs in middle part, hairs longer and denser along margin; lowermost part of capsule glabrous. Seeds about 1 mm long, 0.5 mm broad, reticulate on surface, winged, light. July to September.

In meadows, on grassy slopes, along forest edges, among brush wood, in dry sandy and pebbly soils.—*Soviet Far East*: Ussuri. *General distribution*: Japan, China, Korea, Tibet. Described from northern China. Type in Leningrad.

*Note*. According to V.L. Komarov (*Flora Manchzhurii* III, 440), two forms are distinguished by external appearance; with simple stems (f. *simplex* Kom.) and with branched stems (f. *ramosa* Kom.)

### Genus 1352.—*EUPHRASIA*<sup>1, 2</sup> L.

557 L. Sp. pl. (1753) 604, p.p.: Gmel. Fl. Sib. III (1768) 212; Wettst. in Pflanzenfam. IV, 3b (1893) 100; id. Monogr. Gatt. Euphr. (1896) 8.

Flowers axillary, solitary, in terminal, spicate or racemose, generally many-flowered inflorescences, ebracteolate. Calyx tubular or campanulate, 4-partite, with teeth somewhat connate in pairs, thus appearing bilabiate (with lateral lips). Corolla with narrow, gradually broadening tube, with bilabiate limb, bilobed upper lip with somewhat recurved lobes, lower lip 3-lobed. Stamens 4, didynamous, converging under upper lip; anther locules parted, parallel, pointed at base, similar or (in our species) one of the chambers longer pointed. Style pilose; stigma capitate, lanate; ovary bilocular, loculi identical with numerous or rarely few ovules. Capsule oblong, flattened, dehiscence loculicidal. Seeds pendulous, longitudinally striated. Annual (in USSR) or perennial parasitic herbs of "green parasite" or "semiparasite" type, with weakly developed root system and suckers. Leaves opposite or almost so, dentate or incised, gradually transforming into bracts; lower leaves often larger (broader) than upper, cauline leaves.

The USSR has representatives of only one subgenus *Eu-Euphrasia* (Wettst.) Jörgens and one section—*Semicalcaratae* Benth. em.

*Note*. Section *Semicalcaratae* Benth. of the genus *Euphrasia* is one of the most complex groups of the flora of the USSR. It is well known that the many component species of this group were usually considered to belong to only one botanical species, *E. officinalis* L. (compare, for example, the synonymy of their names in Vol. I of "Index Kewensis"), despite the fact that some of them have long been segregated, and that only after publication of the classic monograph of the genus by Wettstein did the attitude toward them change sharply. Special monographical treatments on species of the genus *Euphrasia* have been published in a whole series of countries, which have resulted in Wettstein's introduction of the

<sup>1</sup> Treatment by S.V. Juzepczuk.

<sup>2</sup> The Greek word *euphrasia* means good spiritual attitude, pleasure, joy. It is assumed that the plant is so named because of healing properties attributed to it (refer to *E. rostkoviana* Hayne).

narrow species concept firmly taking root in the latest literature on this genus.

However, in spite of availability of this literature, the taxonomic study of this group even within Europe alone can hardly be considered as complete. The large number of concrete species comprising this section, extreme polymorphism of most of these species, unsteady character of their distinctive features, extensive development of hybridization processes resulting in the appearance of numerous, partly consolidated intermediate ("interserial") forms—all these factors make study of this genus extremely difficult. It is not surprising that several questions concerning separate forms remain unexplained, while many forms, obviously, are not yet discovered. Besides, due to the considerable morphological similarity of several species actually belonging, as might be suspected, to various genetic series (*sensu* Komarov), as well as apparently hybridogenic character of many species, even the construction of these series becomes extremely difficult. It is enough to emphasize that even Wettstein himself could not quite succeed in this respect. The latter situation is all the more remarkable, because the genus *Euphrasia* was one of the two genera on which Wettstein mainly developed his "geographical-morphological method." It is true that later authors introduced several positive steps into the construction of a rational system of sections and the separation of its component "series." However, we are still very far from the final solution of this problem.

In the present work, we have on the whole adopted Pugsley's recent classification of subgenus *Eu-Euphrasia*, the preliminary character of which is obvious to us, after having arranged only the groups accepted by him in another order and having split up some of his "series".

Another major problem, partly resolved on the basis of the available material of *Euphrasia*, is the phenomenon of so-called "seasonal dimorphism" (or "trimorphism" or even "pleiomorphism"). Wettstein, seeing the main cause of this phenomenon in human activity, namely regular mowing in the meadows, differentiated two races in many European species of eyebright (just as in other genera with "seasonal dimorphism"): an early-flowering spring (presummer) race, speedily ending its life cycle, i.e., completing the flowering and fruiting stages in the meadows before haymaking, and a late-flowering autumn (postsummer) race, showing slow growth in the early stage of its life cycle and reaching full development only after haymaking (as we see, the term "seasonal dimorphism" is understood by us in a sense quite different from that in which the zoologists understand it; it has been proposed, therefore, to replace it with the term "seasonal diphylysm"). Spring



559 races are characterized by developed nodes and elongated internodes, by fewer internodes, simple or sparsely branched stems, more obtuse teeth on the leaves (cauline and floral) and the early appearance of the first flowers, usually on 2nd to 4(6)th node, counting from below. Autumn races, on the contrary, have approximate lower nodes, often leading to the formation of something similar to a rosette of lower leaves, shortened internodes, greater in number, somewhat profusely branched stems, more acute teeth on the leaves and first flowers appearing at a higher level (usually at 6–12th node). Later authors have described also summer races for the corresponding genera intermediate between spring and autumn races on basis of morphology and flowering time; these races began to be generally considered as precursors, not yet 'split' into spring and autumn races. For genus *Euphrasia*, similar races, found, as a rule, in places without regular haymaking practice were established particularly by V.N. Khitrovo. Observations show, however, that similar schemes, which are well documented for some genera and several countries, are rather abstract (theoretical) constructions for the corresponding species of eyebright in the USSR, and that no limits between these seasonal forms can actually be observed here for the most part. Thus, in meadows with a late-mowing practice, spring races are directly mixed with summer races, as if blending with them; in places without a haymaking practice, summer races are inseparable from autumn races and so on. We, therefore, confine ourselves to proposing for separate status only the few species of ours. (*E. brevipila* Burn. and Gr., *E. rostkoviana* Hayne, *E. fennica* Kihlm.) that are the most sharply differentiated from the spring meadow races (*E. tenuis* Wettst., *E. montana* Jord., *E. onegensis* Cajand.), retaining their binomial names, and pointing out that no sharp limits between them and the late-flowering forms are very often observed. As emphasized by Jörgensen, this is exactly what Wettstein did in practice, when he separated as an individual species only the most typical "presummer" form of a particular type actually representing a continuous series of asynthetic forms. Refer also to the notes on the separate species (*E. brevipila* Burn. and Gr., *E. condensata* Jord., *E. parviflora* Schagerstr., *E. rostkoviana* Hayne, *E. fennica* Kihlm., and others).

Most recently, several authors (Jörgensen, Soo) have expressed the idea that man's role in the origin of seasonal pleiomorphism is exaggerated and that the natural environments have a considerable effect on the formation of the species. In any case, many species of eyebrights while not revealing features of any differentiation into seasonal races, always have the habit of a spring, summer or autumn species, without apparently depending on human activity.

1. Floral leaves broader than 1/2 their length, orbicular, to oblong, teeth approximate; capsule long-ciliate along margin; hairs (cilia) erect, (Subsection *Ciliatae* Jörgens.) ..... 2.
- + Floral leaves narrower than 1/2 their length, linear to lanceolate, with markedly spaced teeth; capsule glabrous or sometimes very weakly ciliate, ciliae curved [subsection *Angustifoliae* (Wettst.) Jörgens.]... 62. *E. salisburgensis* Funk.
2. Leaves, bracts and calyx without glandular pubescence or pubescent with short-stalked glands, i.e. glandular hairs with 1–2 (sometimes 3-) cellular stalks ..... 3.
- + Leaves, bracts and calyx pubescent with long-stalked glands, i.e. glandular hairs with multicellular, generally crispate stalks (Series *Hirtellae* Pugsl.) ..... 57.
3. Caucasian and Crimean high-altitude plants, comparatively short and well-proportioned, usually with stems profusely branched (often almost from base), leaves cuneately narrowed into short petiole, sparsely dentate, flowers somewhat distinctly pedicellate (sessile only in Crimean representative of this group). (Series *Petiolares* Pugsl. s. str.) ..... 4.
- + Characteristics different ..... 13.
4. Leaves and bracts without glandular pubescence ..... 5.
- + Leaves and bracts glandular hairy ..... 9.
5. Flowers large, (6)7–12 mm long dorsally ..... 6.
- + Flowers small, 4–6 mm long dorsally ..... 7.
6. Upper cauline leaves with subobtuse, floral leaves with acute, but not aristate, teeth; teeth small, narrow, generally not curved ..... 44. *E. alboffii* Chab.
- + Upper cauline leaves with acute floral leaves; teeth acute and aristate, very large and broad, variably curved ..... 45. *E. macrodonta* Juz.
7. Floral leaves somewhat aristate-dentate, petiole-like narrowed at base; stems generally simple or very weakly branched ..... 52. *E. woronowii* Juz.
- + Floral leaves crenate or somewhat sharply toothed, but not aristate-dentate, cuneate at base; stems often somewhat profusely branched in lower part ..... 8.
8. Leaves subglabrous or densely white-hispidulous only along veins; inflorescence elongated, rather lax ..... 46. *E. kemulariae* Juz.
- + Leaves hispidulous on both surfaces; inflorescence short, compressed at first, later somewhat (comparatively less) elongated ..... 51. *E. daghestanica* Juz.
9. Flowers large compared with plant measurements, (6)7–10 mm long dorsally ..... 10.
- + Flowers small, 3–6(7) mm long dorsally ..... 11.

10. Stems generally without glandular pubescence or (especially in upper part under nodes) sparsely covered with short-stalked glands ..... 47. *E. petiolaris* Wettst.  
 + Stems densely glandular almost throughout length, glands somewhat long-stalked ..... 48. *E. adenocaulon* Juz.
11. Caucasian plants, with flowers distinctly pedicellate ..... 12.  
 + Crimean plants, with sessile flowers ..... 53. *E. taurica* Ganesch.
12. Leaves green, generally cuneate at base, usually not deflexed along tooth margins; inflorescence later elongated ..... 49. *E. ossica* Juz.  
 + Leaves dark green, often with suborbicular base, generally deflexed along tooth margins; inflorescence compressed, subcapitate at first, later slightly elongated ..... 50. *E. sevanensis* Juz.
13. Leaves and bracts glabrous or pilose, glandular hairs absent or isolated ..... 14.  
 + Leaves and bracts, as a rule, somewhat densely covered with short-stalked glands ..... 47.
14. Western Ukrainian high-altitude plants with very large, (9)10–13 mm long corolla, with tube somewhat elongated at final flowering stage and with broad, tapering lower lip much longer than upper (Series *Alpinae* Rothm.) ..... 15.  
 + Characteristics different (flowers not as large) ..... 16.
15. Upper cauline leaves acute, with acute teeth; floral leaves gradually narrowed toward base ..... 40. *E. kernerii* Wettst.  
 + Upper cauline leaves obtuse, with obtuse teeth; floral leaves broadly ovate, narrowed at base into very short petiole ..... 41. *E. picta* Wimm.
16. Very well-proportioned plants, glabrous throughout or diffusely hairy on stem, with comparatively small, shining leaves and small flowers. Plants of western areal, found in USSR in Baltic Region (Series *Micranthae* Juz.) ..... 30. *E. micrantha* Rchb.  
 + Characteristics different ..... 17.
- 562 17. Central Asian plants with leaves without glandular pubescence; teeth of floral leaves non-aristate or short-aristate; pedicels reaching 3 mm. (Series *Petiolares* Pugsl. p.p.) ..... 18.  
 + Characteristics different ..... 19.
18. Tien Shan plants, generally with simple stems, leaf base broad-cuneate or suborbicular, teeth of floral leaves generally aristate-dentate, aristae often hamate ..... 42. *E. peduncularis* Juz.  
 + Pamir-Alai plants; stems branched generally almost from base, branches long; leaf base cuneate; teeth of floral leaves generally non-aristate ..... 43. *E. schugnanica* Juz.
19. Floral leaves, as a rule, with long, narrow and acute, somewhat long-aristate teeth above ..... 20.



- + Teeth of floral leaves shorter and broader, obtuse or acute, sometimes short-pointed, but not aristate, or very shortly aristate ..... 33.
- 20. Soviet Far Eastern plant, with very tall stem, up to 50 cm, branched in upper half, with comparatively small leaves, much shorter internodes and orbicular floral leaves ..... 1. *E. maximowiczii* Wettst.
- + Characteristics different ..... 21.
- 21. High-altitude plants, with generally simple stems and less number of cauline leaf pairs [1–4(5)]; first flower on 2–5(6)th node ..... 22.
- + Mountain, steppe and forest plants of different appearance ..... 24.
- 22. Central Asian plant with short stem, approximate stem nodes and large calyx accrescent in fruit ..... 7. *E. macrocalyx* Juz.
- + Nodes of stem somewhat markedly spaced; calyx in fruit scarcely accrescent or almost non-accescent ..... 23.
- 23. Southern Siberian (and Mongolian) plant with short inflorescence, ovate-rhombic floral leaves, cuneate at base ..... 5. *E. syreitschikovii* Govor.
- + Caucasian plant with broadly ovate floral leaves ..... 10. *E. townsendiana* Freyn.
- 24. Caucasian mountain plants with subglabrous (rarely pilose) leaves, floral leaves cuneate at base and calyces broadening in fruit .... 25.
- + Characteristics different ..... 26.
- 25. Leaves green, upper ovate; inflorescence extremely compressed at first, with imbricate leaves, later elongated; flowers 7–10 mm long ..... *E. pectinata* Ten.
- 563 + Leaves glaucescent, dark green, upper broadly ovate with broadly cuneate base; inflorescence often extremely elongated; flowers 6–7 mm long ..... 9. *E. georgica* Kem.-Nath.
- 26. Steppe, mountain-steppe and forest-steppe plants with generally hispid leaves, rounded at base (and not gradually narrowed); calyx not accrescent in fruit ..... 27.
- + Plants with different complex of characteristics ..... 28.
- 27. Stem simple or branched, 8–45 cm tall; cauline leaves usually markedly spaced; teeth of floral leaves usually distinctly and somewhat long chondroid-aristate ..... 3. *E. tatarica* Fisch.
- + Plant of Crimean Yaila with generally simple stem, 3–20 cm tall, with somewhat approximate stem nodes; teeth of floral leaves somewhat short-aristate, non-chondroid ..... 6. *E. irenae* Juz.
- 28. Leaves glabrous or subglabrous (in latter case usually with very short and generally sparse bristles along leaf margin). ..... 29.
- + Leaves somewhat pubescent ..... 32.
- 29. Flowers small, 4–5(6) mm long, European plant ..... 29. *E. glabrescens* (Wettst.) Wiinst.
- + Flowers larger ..... 30.

30. Stem branches usually long, if present; cauline leaves with broad subacute teeth; only teeth of floral leaves somewhat short-aristate; flowers distinctly pedicellate; corolla about 7 mm long ..... 11. *E. jacutica* Juz.
- + Stem branches, if present, generally (comparatively) short; upper cauline leaves and floral leaves with acute aristate teeth; flowers sessile; corolla up to 10 mm long ..... 31.
31. Floral leaves and calyx generally glabrous throughout and always eglandular; flowers white, with pale sky-blue upper lip; capsule not emarginate; plant of dry habitat (pine, juniper forests, etc.) with generally erect, often profusely branched stem ... 12. *E. condensata* Jord.
- + Pubescence of floral leaves and calyx usually with at least isolated glands, rarely eglandular; flowers lilac or white, with pale lilac upper lip; capsule emarginate; plant of damp habitat (usually meadows), often with flexuous stem, degree of branching extremely variable... 14. *E. bravipila* Burn. and Gremli.
32. Teeth of upper cauline leaves subobtuse, not aristate, teeth of floral leaves aristate; floral leaves cuneate at base; all leaves hispid; corolla 9–11 mm long, pale blue; Siberian plant ..... 4. *E. sibirica* Serg.
- 564 + Teeth of upper cauline leaves subacute, aristate, teeth of floral leaves long tapering, aristate; floral leaves broadly cuneate at base; all leaves covered with rather long, patent, somewhat bristly hairs; corolla 6–9 mm long, whitish, with pale violet or sky-blue upper lip; European plant ..... 13. *E. reuteri* Wettst.
33. Spring ("early summer") meadow plant of European USSR (and Western Siberia), flowering in meadows before haymaking, with few stem nodes (2–6) and elongated internodes ..... 34.
- + Characteristics different ..... 35.
34. Leaves, bracts and calyx glabrous or sparsely hispidulous, sometimes with isolated short-stalked glands; teeth of floral leaves generally subacute or short-pointed, sometimes short-aristate; corolla 7–10 mm long, generally whitish with violet upper lip or lilac. .... 15. *E. tenuis* (Brenn.) Wettst.
- + Leaves, bracts and calyx covered with simple hairs or bristles or (sub) glabrous, eglandular; corolla 5–6 mm long, reddish lilac in type form, sometimes white ..... 28. *E. uechtritziana* Jung. and Engl.
35. Soviet Far Eastern plants with villous leaves and bracts and yellow flowers ..... 36.
- + Pubescence of leaves different; flowers not yellow ..... 37.
36. Stunted and short plant 2–15 cm tall; stem generally simple; calyx very short, about 3 mm long, with rounded base and broad, subacute teeth; corolla 3–4 mm long ..... 36. *E. mollis* (Ldb.) Wettst.

- + Plants taller, 14–25 cm tall, with moderately branched (in first half) stem; calyx about 4 mm long, narrowed at base, with acute, often short-aristate teeth; corolla up to 6 mm long ..... 37. *E. pseudomollis* Juz.
- 37. Caucasian high-altitude plants with hispid leaves and suborbicular bracts with subcordate base, capitate inflorescence, small 3–5 mm long corolla and obtuse or subobtuse calyx teeth ..... 38.
- + Characteristics different (all or some) ..... 39.
- 38. Floral leaves subcordate at base; calyx teeth extremely obtuse; corolla about 5 mm long ..... 38. *E. amblyodonta* Juz.
- + Floral leaves broadly cuneate at base; calyx teeth more acute; corolla 3 mm long ..... 39. *E. juzepczukii* Denissova.
- 565 39. Soviet Far Eastern plant with suborbicular leaves, truncate at base, with pale violet corolla 4–6 mm long (dorsally measured) and with disproportionately large lower lip ..... 2. *E. ussuriensis* Juz.
- + Characteristics different ..... 40.
- 40. European plant of forest zone with typical “autumn” habit, usually somewhat profusely branched; first flower usually appearing at 6–12th stem node; flowers 4–5 mm long ..... 27. *E. parviflora* Schagerström.
- + High-altitude, arctic and subarctic plants with different appearance ..... 41.
- 41. Flowers of medium size, (6)7–10 mm long dorsally ..... 42.
- + Flowers small, usually less than 6 mm long ..... 45.
- 42. High-altitude, stunted plant of Altai mountains; stem 2–6 cm tall; flowers comparatively large, 6.5–8 mm long ... 35. *E. altaica* Serg.
- + Arctic and subarctic plants with different habit ..... 43.
- 43. Inflorescence short, almost not scarcely elongated by late flowering stage; bract teeth not aristate ..... 20. *E. hyperborea* Jørgens.
- + Inflorescence elongated by final flowering stage, nodes somewhat distant; bract teeth often short-aristate ..... 44.
- 44. Stem generally simple; bract teeth rather deeply incised, often very narrow and variably curved; calyx teeth comparatively longer; flowers (sub) sessile ..... 21. *E. saamica* Juz.
- + Stem generally with few, sometimes rather long branches in lower part; leaf teeth not so deeply incised, generally broad, and not curved; calyx teeth very long; flowers generally distinctly pedicellate ..... 22. *E. subpolaris* Juz.
- 45. Arctic and subarctic plant with simple or weakly branched stem and elongated internodes; bracts obtuse or short-pointed, strongly connivent, densely imbricate, broadly ovate or suborbicular, with cuneate base ..... 31. *E. frigida* Pugsl.
- + High-altitude plants of different habit ..... 46.
- 46. Flowers up to 5–6 mm long, exceeding calyx; calyx sometimes glandular; capsule oblong, emarginate. .... 32. *E. tatrae* Wettst.



- + Flowers very small, about 4 mm long, almost not exceeding calyx; calyx hispidulous along mid-ribs and teeth, otherwise subglabrous (eglandular); capsule elliptical, not emarginate. .... 33. *E. grossheimii* Kem.-Nath.
- 566 47. Stem pubescence rather densely intermixed with comparatively long-stalked glands (Series *Jaeschkeanae* Juz.) ..... 48.
- + Stem pubescence usually not intermixed with glands or with sparse, short-stalked glands ..... 51.
- 48. Glandular hairs on stems medium in length or short; flowers sessile ..... 26. *E. krassnovii* Juz.
- + Glandular hairs on stems long and slightly crispate, similar to hairs characteristic of species of series *Hirtellae* Pugsl.; flowers generally distinctly pedicellate ..... 49.
- 49. Cauline leaves broadly elliptical to suborbicular; corolla about 7 mm long ..... 24. *E. cyclophylla* Juz.
- + Cauline leaves of different form; corolla larger, up to 10(11) mm long ..... 50.
- 50. Stem somewhat densely glandular; cauline leaves elliptical or ovate with 2-3 teeth, floral leaves with 3-5 teeth on either side; glandular hairs on them 2-3-cellular ..... 23. *E. bajankolica* Juz.
- + Stem diffuse-glandular; cauline leaves ovate-rhombic, with 4-7 teeth, floral leaves with 5-7 teeth on either side, glandular hairs on them 1-2-cellular ..... 25. *E. tranzszelii* Juz.
- 51. Bracts with somewhat long-aristate teeth ..... 52.
- + Bracts with non-aristate or very short-aristate teeth ..... 54.
- 52. Corolla of medium size or rather large, 6-10 mm long dorsally; inflorescence later much elongated; plants of European USSR (and Western Siberia) ..... 14. *E. brevipila* Burn. and Gremli.
- + Corolla smaller, 5-7(8) mm long; inflorescence later slightly elongated, often remaining condensed; Caucasian plants ..... 53.
- 53. Plant of middle mountain zone, with strong, simple or branched stem and large number of stem internodes, lower internodes somewhat reduced; corolla comparatively small, 5-7 mm long ..... 16. *E. caucasica* Juz.
- + High-altitude (alpine) plant with slender simple stem and small number (4-5) of extremely elongated internodes; corolla somewhat larger, 6-8 mm long ..... 17. *E. svanica* Kem.-Nath.
- 54. Spring ("early summer") meadow plant of European USSR (and Western Siberia), flowering in meadows before hay making, with small number of stem nodes (first flower appearing on 2-6th node) and somewhat elongated stem internodes ..... 15. *E. tenuis* (Brenn.) Wettst.
- + Characteristics different ..... 55.

55. Stem generally much branched in lower part; inflorescence later  
567 extremely elongated; flowers distinctly pedicellate; pedicels in fruit  
elongated upto 4 mm ..... 19. *E. fedtschenkoana* Wettst.  
+ Stem simple or with isolated branches; inflorescence even in fruit  
comparatively less elongated; flowers subsessile; pedicels in fruit not  
elongated or scarcely so ..... 56.
56. Small-leaved, almost stunted plant; bract teeth non-aristate, flowers  
very small, about 4 mm long ..... 34. *E. drosophylla* Juz.  
+ Plant large-leaved, normally not stunted; stem up to 30 cm tall; bract  
teeth short-aristate, flowers up to 6 mm long .....  
..... 18. *E. regelii* Wettst.
57. Bracts somewhat densely glandular ..... 58.  
+ Bracts sparsely glandular, usually at base ..... 63.
58. Corolla large, 8–14 mm long (dorsally measured) ..... 59.  
+ Corolla usually less than 8 mm long ..... 61.
59. Meadow plant of European USSR, flowering before haymaking, with  
spring habit, i.e. generally with simple or sparsely branched stem and  
small number of elongated internodes ..... 56. *E. montana* Jord.  
+ Plant generally profusely branched, with large number of internodes  
..... 60.
60. Soviet Far Eastern plant; stem branched mainly in upper part; plant  
generally glandular-pubescent only at nodes; bract teeth subaristate;  
calyx in fruit distinctly accrescent ..... 54. *E. amurensis* Freyn.  
+ European plant with stem branched mainly in lower part, glandular-  
pubescent generally throughout along (upper) internodes; calyx almost  
non-acrescent in fruit ..... 55. *E. rostkoviana* Hayne.
61. Corolla of medium size, usually 7–8(9) mm long ..... 62.  
+ Corolla small, usually 4–6(7) mm long ..... 59. *E. hirtella* Jord.
62. Plant with “summer” habit; stem up to 40 cm tall, simple or often  
somewhat branched; internodes comparatively short; first flower ap-  
pearing usually not below 5–6th node ..... 57. *E. fennica* Kihlm.  
+ Plant with “spring” habit; stem simple or weakly branched, up to  
20 cm tall, nodes fairly distant; first flower appearing usually at  
3–4th node ..... 58. *E. onegensis* Cajand.
63. Flowers rather small or of medium size, about 6 mm long; stem strong,  
up to 20 cm tall ..... 60. *E. sosnowskyi* Kem.-Nath.  
568 + Flowers very small, about 4 mm long; weak high-altitude plant, not  
more than 12 cm tall ..... 61. *E. bakurianica* Juz.

Subgenus 1. *EU-EUPHARASIA* (Wettst. Monogr. Gatt. Euphr. 1896.  
p. 68 pro part., nom. *Eueuphrasia*) Jörgens. in Bergens. Mus. Aarb. (1919)  
70.—Anthers pilose; leaves and bracts entire, with 1–10 teeth on either  
side.

Section 1. *Semicalcaratae* Benth. in DC. Prodr. X (1846) 552 emend. Wettst. l.c. 68 (pro subsect.)—Annual species, endemic in northern hemisphere; one anther lobe of each of 2 posterior stamens with long cusp at base, resembling spur.

Subsection 1. *Ciliatae* Jørgens. Euphr.-Art. Norw. in Bergens Mus. Aarb. (1919) 61.—Leaves glabrous, pilose or glandular; floral leaves broader than upper cauline, at least 1/2 as broad as long, orbicular to lanceolate, dentate, with approximate teeth or rarely crenate. Capsule long-ciliate.

Series 1. *Pectinatae* Pugsl. in Journ. Bot. LXXIV (1936) 286.—Plants weakly branched, generally hardy. Leaves generally with slender teeth, glabrous or hirsute, eglandular. Corolla small or somewhat large, with lower lip longer than upper. Capsule comparatively narrow, generally not emarginate or scarcely so.

1. *E. maximowiczii* Wettst. Monogr. Gatt. Euphr. (1896) 87.—*l.c.*: Wettst. l.c. tab. III, f. 120–126; tab. XI, f. 4.

Annual. Stem 12–50 cm tall, erect, well-developed, virgate, branched usually in upper half, rarely in upper 2/3 or only at tip; branches sometimes equaling height of main stem, erectopatent, pubescent with whitish, slightly crispate, generally recurved hairs; stem becoming red or brown. Cauline leaves numerous, comparatively small, always much shorter than internodes, ovate to broadly ovate, narrowed (lower leaves) or truncate (upper leaves) at base, subobtuse or subacute, with 3–8 acute teeth on either side, aristate only in upper leaves. Bracts similar to cauline leaves, but broader, with subobtuse, orbicular or even cordate base, with 5–8 very acute, usually aristate teeth, teeth variably curved; all leaves flat or often extremely pitted above, with prominent veins beneath, almost sulcate-rugose, pubescent only along margin and veins beneath with whitish, often  
569 very long bristles, rarely hispidulous or asperate, or subglabrous. Inflorescence dense at first, later elongated. Flowers small, subsessile. Calyx hispidulous or subglabrous, moderately accrescent in fruit, with aristate teeth. Corolla dorsally 6–8 mm long; upper lip with 2 tooth-like, recurved lobes, lower lobe scarcely exceeding upper, with 3 sinuate lobes; corolla whitish with violet upper lip, with yellow spot and violet stripes on lower lip. Capsule obovate-cuneate, scarcely emarginate or not, generally shorter than calyx, short-ciliate along margin, otherwise glabrous or puberulent. July to September (Plate XXVII, fig. 1).

In meadows, among scrub, along forest edges.—*Soviet Far East*: Ussuri, Zeya-Bureya. *General distribution*: Japan, China. Described from Japan (Nippon Island). Type in Leningrad.

*Note*. Possibly one of the oldest representatives of subsection *Ciliatae* and at least of series *Pectinatae*.



2. *E. ussuriensis* Juz. in Bot. mat. Gerb. Bot. inst. AN SSSR, XVII (1955).

Annual. Stem 3–15 cm tall, erect or partially ascending at base, straight or slightly flexuous, simple, slender, covered with whitish, extremely recurved hairs, brownish (possibly reddish or violet when alive); internodes elongated. Cauline leaves broadly ovate to suborbicular, broadly cuneate or rounded at base, short-petiolate or subsessile, obtuse or rounded at tip, with few, broad, subobtuse or obtuse teeth, 1–4 (usually 3) on either side; floral leaves similar to upper cauline leaves, but with subacute or acute, and non-aristate teeth, not imbricate; all leaves diffusely pilose above, almost hispidulous or sometimes subglabrous, hispid beneath only along teeth margins and veins, with hairs typically patent and divaricate. Inflorescence few-flowered, later with extremely elongated internodes; flowers of medium size, on very short pedicels. Calyx 3–4.5 mm long, pubescent similarly to leaves, with long, narrow, slender, acuminate teeth. Corolla dorsally 4–6 mm long, with large lower lip, much exceeding upper lip, pale purple, with yellowish spot at base of lower lip, with sharply marked dark violet veins. Capsule elliptical, shorter than calyx teeth, ciliate along margin. July to August.

Dry slopes.—*Soviet Far East*: Ussuri. Endemic? Described from Nakhtakhu Bay. Type in Leningrad.

570 *Note*: This poorly known and extremely critical species is based on a specimen in the Herbarium of the Botanical Institute of the Akad. Nauk SSSR incorrectly identified as *E. maximowiczii* Max. and in a folder with the inscription *E. mollis* (ldb.) Wettst. on it. However, it has very little in common with the latter, being well distinguished by pubescence of the leaves as well as by the remote nodes of the inflorescence and much larger, differently colored flowers with long calyx teeth and a prominent lower corolla lip. In spite of its entirely different habit, we preliminarily are placing it alongside *E. maximowiczii* Wettst., supposing that it is a separate local race of the latter.

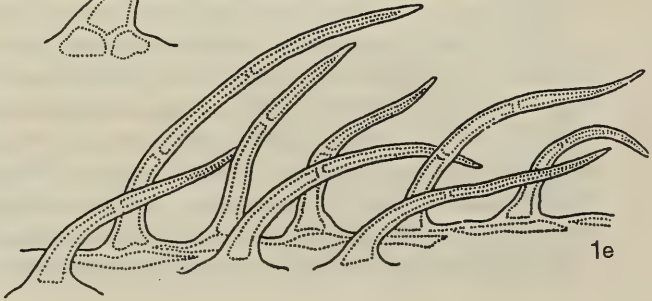
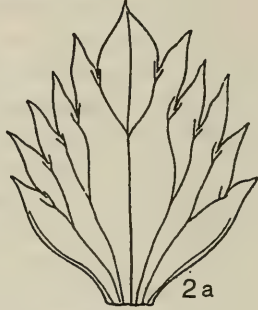
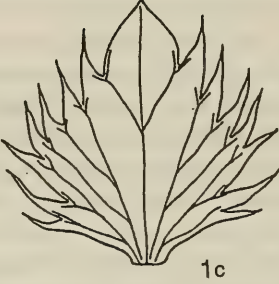
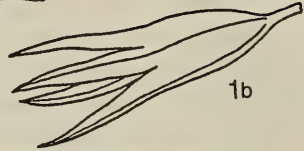
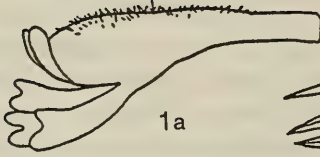
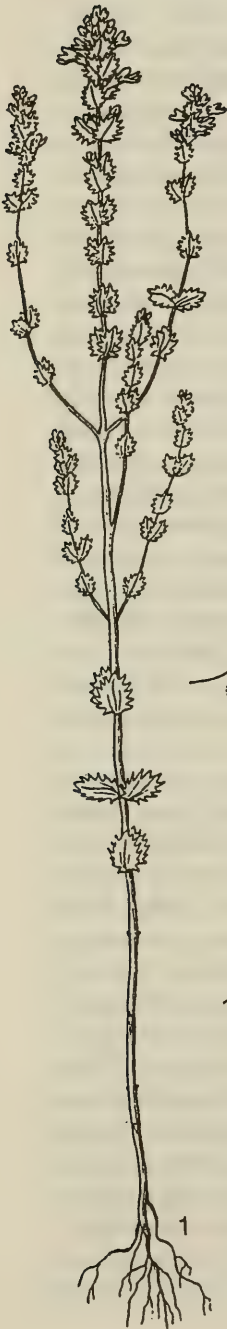
3. *E. tatarica* Fisch. in Spreng. Syst. veg. II (1825) 777; Wettst. Monogr. Gatt. Euphr. 88; Kryl. Fl. Zap. Sib. X, 2478; Grossh. Opred. rast. Kavk. 317.—? *E. puberula* Jord. Pug. pl. nov. (1852) 133.—*E. pubibunda* Simonk. Enum. Fl. Transs. (1886) 432.—*E. officinalis*  $\beta$ . *tatarica* Benth. in DC Prodr. X (1846) 552, p.p.—*E. officinalis*  $\alpha$ . *latifolia* (p.p.),  $\beta$ . *vulgaris* (p.p.) and  $\epsilon$ . *salisburgensis* Ldb. Fl. Ross. III (1847–1849) 263.—*E. officinalis*  $\alpha$ . *stricta* C. Koch in Linnaea, XXII (1849) 685.—*E. officinalis*  $\delta$ . *tatarica* Boiss. Fl. or. IV (1879) 472. p.p.—*E. officinalis* Ldb. Fl. alt. II (1830) 422. pro max. part.; Schmalh. Fl. X, 294, p.p.—*E. schischkinii* Serg. in Tr. Biol. n.-i. inst. Tomsk. Gos.

univ. I (1935) 80; Kryl. Fl. Zap. Sib. X, 2481.—*lc.*: Wettst. l.c. tab. III. f. 127–134; tab. VII, f. 1.—*Exs.*: Dörf. Herb. norm. No. 3352.

Annual. Stem (3)8–45 cm tall, erect, simple or branched in lower or middle part, reddish or brown, covered with short, recurved, slightly crispate hairs, eglandular. Lower cauline leaves opposite, cuneate or obovate, obtuse or (upper) subacute, with 1–5 subobtuse or acute teeth on either side; upper cauline leaves alternate or almost opposite, ovate, broadest in lower part, with cuneate or broadly cuneate base, with 4–7 short-aristate teeth on either side; lower teeth patent, upper arcuate-divergent; floral leaves similar to upper cauline leaves, but usually broader, often with rounded base; all leaves green (usually blackening when dry),  
 573 plicate-striped, with prominent veins beneath, somewhat densely hirsute or strigose, rarely subglabrous, usually obliquely antrorse or even appressed, with somewhat deflexed, often gristly teeth margin, especially in floral leaves. Inflorescence dense at first, compact, with imbricate bracts, later extremely elongated and interrupted; flowers subsessile. Calyx covered with dense, eglandular bristles or sometimes subglabrous, often with mixture of glandular hairs at base, not accrescent in fruit or weakly accrescent; teeth lanceolate, erect or patulous. Corolla small or of medium size, 5–8 mm long at final flowering stage, whitish or pale lilac; upper lip bilobed with recurved, fine toothlike lobes; lower lip 3-lobed, lobes sinuate, pilose beneath, with mixture of glands. Capsule 4–6 mm long, cuneate-oblong, subobtuse or scarcely emarginate, shorter than or equaling calyx teeth, pilose, somewhat long-ciliate along margin. June to September (Plate XXVII, fig. 2).

Steppes, dry meadows and glades, scrub, forest edges.—*European USSR*: Middle Dnieper, Volga-Don, Lower Don, Lower Volga, Trans-Volga Region, Volga-Kama, Black Sea Region, Bessarabia? Crimea; *Western Siberia*: Upper Tobol, Altai Mountains, Irtysh; *Eastern Siberia*: all regions; *Soviet Central Asia*: Dzh.-Tarbagatai, Tien Shan, Pamiro-Alai, mountainous Turkmenia; *Caucasus*: Ciscaucasia, Dagestan, eastern and southern Transcaucasia. *General distribution*: Central Europe, Mediterranean Region, Balkan States-Asia Minor, Iran, Dzh.-Kashgar., Mongolia, Himalayas, Japan, China. Described from Saratov. Type in Leningrad.

*Note.* It is the most widely distributed species of the series in the USSR. Moreover, it is highly polymorphic, which is quite natural, considering on the one hand, its colossal range and, on the other hand the variable conditions under which it is found. The latter circumstance makes it difficult to split it into regional races, though speciation surely occurs. Wettstein very conveniently segregated one of these races—*E. maximowiczii* Wettst. (see above). However, similar attempts later were less successful. Thus, *L.P. Sergievskaya* described a western Siberian forest race (*E. sibirica* Serg.), as yet a puzzling





form, and also two western Siberian, mountain-steppe races—*E. pectinatifomis* Kryl., and Serg., and *E. schischkinii* Serg. The first, apparently, does not differ from the Mongolian *E. syreitschikinii* Gover; the second, placed by us as a synonym of *E. tatarica*, is a form of the latter resembling *E. syreitschikovii*. Compared with this species, the central Asian (Western Tien Shan and Pamiro-Alai) high-altitude form, *E. macrocalyx* Juz., also perhaps directly related to *E. tatarica*, is much more distinct. The Caucasian forms of this type, as revealed recently present a rather complex picture. Initially, Wettstein mistakenly referred them to *E. tatarica* Fisch., later identifying one of them with *E. pectinata* Ten. Kemulyariya-Natadze, in the Caucasus, split off besides *E. tatarica* and *E. pectinata*, also a third form close to *E. pectinata*, and named it *E. georgica* Kem-Nath. Further a Crimean form of *E. tatarica* from the Yaila is published by us in the "Herbariums of the Flora of the USSR" as a separate race, *E. irenae* Juz. Several separate races, adjoin the range of *E. tatarica* at its western and southern limits. *E. reuteri* Wettst., initially identified by Wettstein as *E. tatarica* and later mistakenly assumed by him to be the hybrid *E. parviflora* × *E. condensata*, should, on the one hand, be regarded as one of these. On the other hand, there are races apparently intermediate between *E. tatarica* and *E. frigida* Pugsl. s.l. *E. jacutica* Juz., described below, perhaps belongs to them. In describing below the races mentioned above and others, in part the most poorly known and extremely critical ones, we must make clear that further research probably will add to them more than one comparable form from a number which are as yet undiscovered in the midst of the still too broadly conceived "*E. tatarica*".

4. *E. sibirica* Serg. in Tr. Biol. n-i. inst. Tomsk. Gos. univ. I (1935) 76; Kryl. Fl. Zap. Sib. X, 2478.

Annual. Stem 20–40 cm tall, erect or slightly flexuous, simple or branched in upper half, covered with somewhat crispate, recurved hairs. Cauline leaves evenly distributed, slightly connivent, oblong, with 2–4 subobtuse teeth on either side; floral leaves oblong 1–1 or ovate-rhombic, with cuneate base and long tapering aristate teeth; all leaves covered with simple bristly hairs. Inflorescence somewhat lax, few-flowered, generally dense only at main stem end; first flower appearing at 6–12th node. Calyx 6–7 mm long, with pubescence similar to that of leaves. Corolla rather large, (8)9–11 mm long, usually with very prominent lower lip, pale blue, pilose outside. Capsule 5–7 mm long, oblong, sparsely pilose, with ciliate margin. August to September.

#### Plate XXVII.

1. *Euphrasia maximowiczii* Wettst., general appearance of plant, 1a) corolla, 1b) calyx, 1c) floral leaf, 1d) pubescence of floral leaf. 1e) pubescence of stem.—2. *E. tatarica* Fisch., 2a) floral leaf, 2b) pubescence of floral leaf.

Birch, mixed and pine forests, forest meadows.—*Western Siberia*: Ob' Region, Irtysh. Endemic. Described from vicinity of Tomsk. Type and paratype in Tomsk.

*Note*. Unfortunately, material on this species was not available to us. Possibly, it is only a meadow-forest form of *E. tatarica* Fisch.

5. *E. syreitschikovii* Govor. in Pavl. in Byull. Mosk. obsch. ispyt. prir. XXXVIII, 1–2 (1929) 126; Kryl. Fl. Zap. Sib. X, 2477.—*E. pectinatae-formis* Kryl. and Serg. in Tr. Biol. n.-i. inst. Tomsk. Gos. univ. I (1935) 74.—*E. officinalis*  $\alpha$ . *pectinata* Kryl. Fl. Alt. (1907) 954, non *E. pectinata* Ten.—*Ic.*: Pavl. l.c. p. 126.

575 Annual. Stem 5–15 cm tall, erect or slightly flexuous, usually well developed, simple, green or whitish, covered with whitish, slightly crispate, recurved hairs. Cauline leaves 3–6 mm long, 2–4 mm broad, few, spaced, narrowly ovate and ovate or oblong, obtuse, with 1–3 subobtuse teeth on either side; floral leaves 5–9 mm long, 2–7 mm broad, ovate-rhombic, cuneate at base, subacute at tip, broadest at lower 1/3 or almost in middle, with 3–5 subacute or tapering aristate teeth on either side; all leaves densely hispid, eglandular. Inflorescence rather dense, few-flowered, 1–1.5 cm long; 1st flower appearing at 3–5th node. Calyx 5–7 mm long, pubescence similar to that of leaves, teeth lanceolate, acute. Corolla whitish or pale violet, 7–9 mm long, pilose outside. Capsule oblong-elliptical, 5–7 mm long, not longer than calyx tooth, subobtuse or slightly emarginate, pilose, long-ciliate along margin. July to August.

Damp subalpine meadows, mountain steppes, stony alluvial deposits, pebble-beds along mountain rivulets.—*Western Siberia*: Altai Mountains. *General distribution*: Mongolia. Described from Khangai, Khalzan-Daba Pass near Zain-Gegen. Type in Moscow, isotype in Leningrad.

*Note*. This, in its extreme expression is a rather distinct, comparatively high-altitude form, however, it is scarcely demarcated from the more or less typical form of *E. tatarica* Fisch., which inhabits the lower regions of southern Siberia (and Mongolia).

6. *E. irenae* Juz. in Bot. mat. Gerb. Bot. inst. Akad. Nauk. SSSR, XVII (1955). *E. officinalis*  $\beta$ . *vulgaris* Ldb. Fl. Ross. III (1847–1849) 263, p.p.—*E. officinalis* Schmalh. Fl. II (1897) 294, p.p.

Annual. Stem erect, simple, 3–20 cm tall, violet, covered with rather dense, short, slightly crispate, recurved hairs. Cauline leaves crowded, or rarely somewhat spaced, lower obovate, with rather broadly cuneate base, obtuse, with 1–2 obtuse or subobtuse teeth on either side; upper cauline leaves alternate or almost opposite, obovate, ovate or broadly ovate, broadly cuneate or truncate at base, obtuse or subacute, with 2–4 subobtuse or subacute teeth on either side; floral leaves ovate or broadly ovate, broadest in lower part or middle, broadly cuneate or rounded at base, with

2–5 acuminate or short-aristate, erect or slightly arcuate teeth on either side; all leaves green, or sometimes turning lilac in places (especially on teeth), moderately plicate-striped, somewhat densely, patently hispid, eglandular. Inflorescence condensed at first, later elongated, somewhat interrupted; flowers subsessile. Calyx covered with dense, short, often curved, patent and recurved hairs, eglandular, moderately accrescent in fruit, with lanceolate, erect teeth. Corolla small, 5–7 mm long, whitish, with pale lilac upper lip having violet stripes, pubescent outside. Capsule about 5 mm long, cuneate-oblong, with truncate tip, scarcely emarginate, shorter than calyx teeth, diffusely puberulent, with longer erect hairs along margin. June to August.

Mountain steppes, meadows, rocky places in the Yaila.—*European USSR*: Crimea. Endemic. Described from Chatyr-Dag. Type in Leningrad.

*Note.* A Crimean (Yailinsk) race of the *E. tatarica* aggregate deserving to be split off on the basis of its isolated range.

7. *E. macrocalyx* Juz. in Bot. mat. Gerb. Bot. inst. AN SSSR, XVII (1955).

Annual. Stem short, 2–7 cm tall, erect or partially ascending, simple or short-branched at base, brownish violet, covered with short, recurved hairs. Cauline leaves few, opposite, cuneate or obovate, obtuse, with 1–3 sub-obtuse or obtuse teeth on either side; floral leaves broader, up to broadly ovate, with 2–3 large, subacute or acute, but scarcely aristate teeth on either side, often with slightly recurved margin; all leaves dark green, hispidulous, hairs often thickened at base, denser only along teeth margin and beneath along veins. Inflorescence dense, extremely short at first, later with distant nodes; flowers subsessile or on very short pedicels (in fruit). Calyx hispidulous throughout or only along margin and veins, comparatively large, about 7 mm long, markedly accrescent in fruit, reaching 3 mm in diameter, with broad acute teeth, up to 1.5 mm broad at base. Corolla small, 5–7 mm long, scarcely projecting from calyx, with lower lip usually shorter than upper, pale violet, with yellowish spot on lower lip and with dark violet stripes. Capsule about 7 mm long, 3 mm broad, shorter than calyx teeth, slightly emarginate, diffusely pilose, ciliate along margin. July.

Riparian grass plots in prostrate juniper zone.—*Soviet Central Asia*: Tien Shan (Kirgizsk Ala-Tau). Endemic. Described from Gachke River (tributary of the Ken-Kola River). Type in Leningrad.

576 8. *E. pectinata* Ten. Prodr. della Fl. Nap. in Fl. Nap. I (1811–1813) 36; IV (1830) 86; V (1835–1836) 32; Wettst. Monogr. Gatt. Euphr., 82; idem apud Somm. and Lév. in Tr. Peterb. bot. sada, XVI, 379; Grossh. Opred. rast. Kavk. 317.—*E. officinalis*  $\beta$ . *vulgaris* Ldb. Fl. Ross. III (1847–1849) 263, p.p.—*Id.*: Wettst. l.c. tab. III, f. 101–110; tab. VII, f. 2.—*Exs.*: Dörfl. Herb. norm. No. 4574; Fl. Ital. exs. No. 1346.



Annual. Stem erect, straight, usually simple, rarely with isolated suberect branches, 8–40 cm tall, pale lilac or reddish, covered with recurved, extremely crispate hairs, eglandular. Lower leaves cuneate, with 1–3 obtuse teeth on either side; upper leaves ovate, acute, with 3–5 acute, aristate teeth on either side; floral leaves broadly ovate or rhombic, broadest in middle, broadly cuneate at base, sharply pointed at tip, with 3–5 erect or slightly incurved, acute, long-aristate teeth on either side; all leaves green, plicate-striate, glabrous throughout, or teeth diffusely hispidulous along margin. Inflorescence strongly condensed at first, with imbricate floral leaves, later strongly elongated with markedly distant lower flowers and floral leaves; flowers sessile. Calyx hispidulous, usually eglandular, with sharp aristate teeth, moderately accrescent in fruit. Corolla medium in size, 7–10 mm long, pale violet with dark violet stripes, with lower lip pubescent beneath. Capsule cuneate-oblong, subacute, not emarginate, puberulent, long-ciliate along margin, shorter than calyx teeth. June to August.

Grass plots and other grassy places, scrub, forest edges.—*Caucasus*: Ciscaucasia, eastern and southern Transcaucasia. *General distribution*: Mediterranean Region, Balkan States-Asia Minor, Armenia-Kurdistan, Iran? Described from Italy. Type, probably in Naples.

*Note*. This Mediterranean species was not reported for the Caucasus by Wettstein in his monograph. It was first cited for the USSR on the basis of Wettstein's determination in the well-known work by Sommier and Levier (?), after which many authors began to discover it in the Caucasus. The Caucasian forms of series *Pectinatae*, however, cannot be considered to be definitively studied on basis of extensive material.

9. *E. georgica* Kem.-Nath. in Fl. Gruz. VII (1952) 599.—*E. officinalis*  $\beta$ . *vulgaris* Ldb. Fl. Ross. III (1847–1849) 263, p.p.— *Ic.*: Kem.-Nat. l.c. fig. 351.

- 578 Annual. Stem 10–27(40) cm tall, diffusely crispate-hairy, simple or branched (branching usually from below middle of stem). Leaves lax (distant), variable in size, but large as a rule, glaucescent dark green; lower leaves oblong, with few subacute or subobtuse teeth; upper cauline leaves and floral leaves broadly ovate, with broadly cuneate base, with 5–7 acute, long-aristate teeth on either side, hispidulous along margin and veins, or subglabrous. Inflorescence often intensely elongated; flowers comparatively small, 6–7 mm long, subsessile. Calyx pilose along teeth margin and veins, with lanceolate, long acuminate teeth, slightly accrescent in fruit. Corolla white, with sky-blue or violet upper lip, lobes of lower lip narrow, sinuate at tip and tube slightly elongated by final flowering stage. Capsule oblong obovate, equalling calyx, pubescent above. July to September.

Open dry slopes and rocks in middle mountain zone.—*Caucasus*: eastern Transcaucasia. Endemic. Described from Gombir. Type in Tbilisi.

*Note*. Highly critical form; the features cited for it as distinctive (in relation to *E. pectinata* Ten. and *E. tatarica* Fisch.) seem to us in large measure unreliable.

10. *E. townsendiana* Freyn ex Wettst. in Pflanzenfam. IV, 3b (1893) 101; Monogr. Gatt. Euphr., 83.

Annual. Stem 4–12 cm tall, simple, with 1–5 pairs of cauline leaves; cauline leaves and cotyledonary leaves usually persistent until anthesis; stem brownish violet or not colored in lower part, rather densely covered with recurved hairs. Cauline leaves obovate to elliptical, obtuse, with 1–3 subobtuse or subacute teeth on either side; floral leaves larger, broadly ovate, with 3–5 acute teeth on either side, aristate in upper floral leaves; all leaves green, densely covered with short, simple hairs and short bristles, or sometimes subglabrous. Inflorescence short and condensed at first, few-flowered, later elongated, with distant lower internodes; flowers subsessile. Calyx pubescent similarly to leaves, often with isolated short-stalked glands, scarcely broadened in fruit, with narrow, acute aristate teeth. Corolla small, about 7 mm long, with pale violet or bluish upper lip and with yellow spot on lower lip, with dark violet or dark blue stripes. Capsule elongated elliptical, subobtuse, equaling calyx teeth. June to July.

579 Alpine and subalpine meadows, stony high-altitude steppes.—*Caucasus*: southern Transcaucasia. *General distribution*: Balkan States-Asia Minor. Described from Anatolia. Type, probably in Vienna.

*Note*. Evidently, a high-altitude race of the type of *E. pectinata* Ten. The occurrence of it within the range of the flora of the USSR has not been confirmed.

11. *E. jacutica* Juz. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XVII (1955).—*E. officinalis*  $\beta$ . *vulgaris* Ldb. Fl. Ross. III (1847–1849) 263, p.p.

Annual. Stem 6–35 cm tall, erect, often flexuous, well-developed, simple or branched from base, but more often above base or only in upper part; branches slender, generally long, diverging at acute angle, generally reddish or dark purple, covered with whitish, generally curved and retrorse hairs. Cauline leaves numerous, oblong, cuneate or broadly cuneate at base, subobtuse, with 2–5 oblique, subacute teeth on either side; floral leaves rhombic to broadly ovate, with 3–6 acute or subacute, generally aristate teeth on either side; all leaves usually small, leaves on branches minute, subsessile, flat, glabrous or covered with very fine bristles along teeth margin and veins beneath. Inflorescence condensed at first, later intensely elongated and interrupted; flowers on short, but generally distinct pedicels. Calyx 4–5 mm long, pubescent similarly to leaves, with long,

acute teeth, scarcely accrescent in fruit; teeth lanceolate, generally erect. Corolla comparatively small, usually about 7 mm long, whitish, with pale lilac upper lip and with dark violet stripes; lower lip elongated, with narrow lobes. Capsule narrowly obovate, generally rounded, not emarginate, sparsely ciliate along margin, shorter than calyx teeth.

Stony and sandy river banks, coastal meadows.—*Eastern Siberia*: Lena-Kolyma (middle reaches of Lena River). Endemic. Described from Amga River. Type in Leningrad.

*Note.* We consider this independent subarctic race as intermediate to a certain degree between *E. tatarica* Fisch. and the indigenous East Siberian arctic race referred to series *Boreales* and later described under name *E. subpolaris* Juz.

12. *E. condensata* Jord. Pug. pl. nov. (1852) 135.—*E. ericetorum* Jord. in Boreau, Fl. centr. Fr. ed. 3, II (1857) 494.—*E. stricta* Host. Fl. Austr. II (1831) 185; Wettst. Monogr. Gatt. Euphr. 93 and 297 and auct. pl. Fl. URSS non H.B.K.—*E. officinalis* var. *rigida* and *E. rigida* Lasch 580 in Linnaea, IV (1829) 405.—*E. officinalis*  $\beta$ . *vulgaris* Ldb. Fl. Ross. III (1847–1849) 263, p.p.— *Ic.*: Rchb. Ic. fl. Germ. XX, tab. 1731; Wettst. l.c. tab. III, f. 135–146, tab. VII, f. 5, 6.— *Exs.*: Fl. exs. austro-hung. No. 147; Schultz, Herb. norm. nov. ser. No. 113; GRF, No. 1579; Dörfner, Herb. norm. No. 3354, 3354a.

Annual. Stem erect or slightly flexuous, often rather strong, 5–50 cm tall, simple or often branched in middle and upper part, with comparatively short branches diverging at acute angle, reddish, brownish or dull violet, covered with somewhat long, crispate, white, generally recurved hairs, eglandular, usually leafless on lower part by flowering stage. Lower cauline leaves cuneate, subobtusate, with 1–2 obtuse teeth on either side, middle and upper leaves ovate-lanceolate or ovate, about 2 times as long as broad, broadest in middle, cuneately narrowed at base, mucronate at tip, with 3–5 acute, aristate teeth on either side; floral leaves broader than cauline, ovate or broadly ovate, broadest below middle, broadly short-cuneate at base, sharply pointed at tip, with 4–7 narrow, sharp, long-aristate, often recurved and sinuous teeth on either side; all leaves green, flat or moderately plicate-striate, glabrous throughout or rarely slightly asperate above and along margin with very fine bristles. Inflorescence condensed at first, later intensely elongated, interrupted; flowers subsessile. Calyx glabrous throughout or rarely covered with minute bristles, scarcely accrescent in fruit. Corolla 6–10 mm long, pale violet, sky-blue, with lighter lower lip having bluish violet or dark purple stripes and yellow spot on lower lip, sometimes whitish. Capsule cuneate, narrowly obovate, truncate, or scarcely emarginate, shorter than calyx teeth, long-ciliate along margin, otherwise glabrous or sparsely pilose. June to September.



Sandy pinewoods, thinned-out pine and mixed forests, less often deciduous forests and their edges, heath, open grassy places, forest glades.—*European USSR*: Baltic Region, Ladoga-Ilmen, Dvina-Pechora? Upper Dnieper, Upper Volga, Middle Dnieper, Upper Dniester. *General distribution*: Scandinavia(?), Central and Atlantic Europe, Mediterranean Region (Italy). Described from France. Type not known.

*Note*. 1. Unfortunately, the name *E. stricta* established for this species in our literature cannot be retained on the basis of the rules of nomenclature. The name *E. ericetorum* Jord., given to it by L.P. Sergievskaya is not a prior name. We have adopted for it the name used in the work of the British monographer of the eyebrights, Pugsley.

581 2. We consider doubtful the reports of *E. condensata* Jord. (*E. stricta* Host.) for the more eastern regions of our flora (including Western Siberia and the Volga-Don). Plants originating from any of these regions, identified as *E. stricta*, pertain for the most part to forms of *E. tatarica* Fisch. The reports of "*E. stricta*" for the Caucasus, where other forms (of the type of *E. pectinata* Ten.) replace it, are also entirely arbitrary.

3. As a seasonal spring race of "*E. stricta*", Wettstein described from Sweden the separate species *E. suecica* Murb. and Wettst., which has repeatedly been cited also for various regions of the USSR (including the Volga-Kama Region). It is doubtful, however, whether *E. condensata* develops an early-flowering (before hay-making) meadow race in the USSR. As regards genuine *E. suecica*, since it has now been treated as only an eglandular form (f. *eglandulosa* or f. *subeglandulosa* Lindb. f.) of *E. tenuis* (Brenn.) Wettst., we have regarded it as synonym of the latter.

13. *E. reuteri* Wettst. Monogr. Gatt. Euphr. (1896) 284.—*E. stricta* × *curta*? Wettst. l.c.—*E. stricta* var. *pilifera* Kihlman in Acta Soc. pro F. and Fl. Fenn. XIII, 5 (1897) 8.—*Ex.*: Fl. Finl. exs. No. 348.

Annual. Stem erect, straight or often branched in lower half, 8–30 cm tall, green or generally reddish violet, sparsely or rather densely covered with crisped, recurved hairs, eglandular. Lower cauline leaves cuneate, subobtusate, with 1–2 obtuse teeth on either side; middle and upper leaves ovate, broadest in middle or below, about 2 times as long as broad, acute, with 3–4 sharp aristate teeth on either side, subsessile; floral leaves broader than cauline, broadly ovate or suborbicular, broadest at lower 1/3, broadly cuneate at base, acute, with 4–6 large, acute, somewhat long-aristate teeth on either side; all leaves green, flat or slightly rugose beneath, pubescent on both surfaces with scattered hairs; hairs especially along margin and veins beneath dense, rather long, patent, somewhat hispid, spaced, sometimes densely covering entire lower surface of leaves. Inflorescence rather dense at first, later intensely elongated; flowers subsessile. Calyx sparsely or densely covered with bristles, eglandular. Corolla 6–9 mm

long, whitish, with pale violet or sky-blue upper lip, with yellow spot and violet stripes on lower lip. Capsule oblong, truncate, subemarginate, long-ciliate along upper margin, otherwise puberulent or subglabrous. July to August.

- 582 Grassy places along banks of lakes and rivers, along roadsides, etc.—*European USSR*: Baltic Region, Ladoga-Ilmen. *General distribution*: Scandinavia, Central Europe (East Germany). Described from Sweden, Germany, Finland, Baltic Region. Type not known.

*Note.* Wettstein, as noted in the synonymy, suspected a hybrid origin of this plant. However, as indicated by Lindeberg, it is abundant in some places in Finland, though one of the assumed parents, *E. condensata*, apparently, does not grow there. We happened to observe *E. reuteri* Wettst., occurring in masses even in the absence of the “parents”, also in the Latvian-SSR.

Series 2. *Brevipilae* Pugsl. in Journ. Linn. Soc. Bot. XLVIII (1930) 515.—Plant with simple or somewhat poorly branched stem, often hardy, tall. Leaves generally with slender aristate teeth, rarely crenate, with short-stalked glands, rarely subglabrous or somewhat hispid. Corolla usually large, rarely small, with broad lower lip much longer than upper. Calyx in fruit somewhat weakly accrescent. Capsule large, generally emarginate.

*Note.* We have followed in the present work the view-point of Pugsley, who regards forms of eyebrights close to species of series *Pectinatae*, but with short-stalked glands, as members of a separate series. We emphasize strongly, however, that we do not consider this as the final and only possible point of view. Further research, possibly, may make it necessary to merge the series *Pectinatae* and *Brevipilae*.

14. *E. brevipila* Burn. and Gremli apud Towns. in Journ. Bot. XXII (1884) 167 (nomen) Gremli Excursionsfl. f. die Schweiz ed. V (1885) 329; ej. Neue Beitr. z. Fl. d. Schweiz, IV, 23; Wettst. in Oesterr. Bot. Zeitschr. XLIV, 92; Monogr. Gatt. Euphr. 109.—*E. officinalis* Schmalh. Fl. II, 294, p.p.—*E. officinalis*  $\beta$ . *vulgaris* Ldb. Fl. Ross. III (1847–1849) 263, p.p.—*E. officinalis*  $\epsilon$  *brevipila* Kryl. Fl. Alt. (1907) 956.—*E. nemorosa* Trautv. Increm. Fl. Ross. II (1883) 589, p.p.—*E. prae-*  
585 *brevipila* Chitr. in Tr. Bot. muz. III (1907) 27; Kryl. Fl. Zap. Sib. X, 2483.—*E. brevipila* ssp. *aestivalis* and ssp. *serotina* Ganesch. in Maevsk. Fl., ed. 6 (1933) 610 and 611.—*E. brevipila* f. *eglandulosa* and f. *subeglandulosa* Lindb. fil. in Meddel. af. Soc. pro F. and Fl. Fenn. 26 (1910) 45.—*Ice.*: Rchb. Ic. fl. Germ. XX, tab. 1733, f. I and f. 1 and 2; tab. IV, f. 154–161; tab. VII, f. 8 (sec. Wettst.): Wettst. monogr. Gatt. Euphr. tab. IV, f. 154–161, tab. VII, f. 8. *Exs.*: Fr. Herb. norm. IX, No. 17; Meinsh. Herb. Fl. Ingr. No. 469; Pl. Finl. exs. No. 349a and b; Herb. Fl.

Ross. No. 280 (nom. *E. stricta* Host; *E. b. f. subeglandulosa* Lindb. fil.), No. 521; Dörf. Herb. norm. No. 3356.

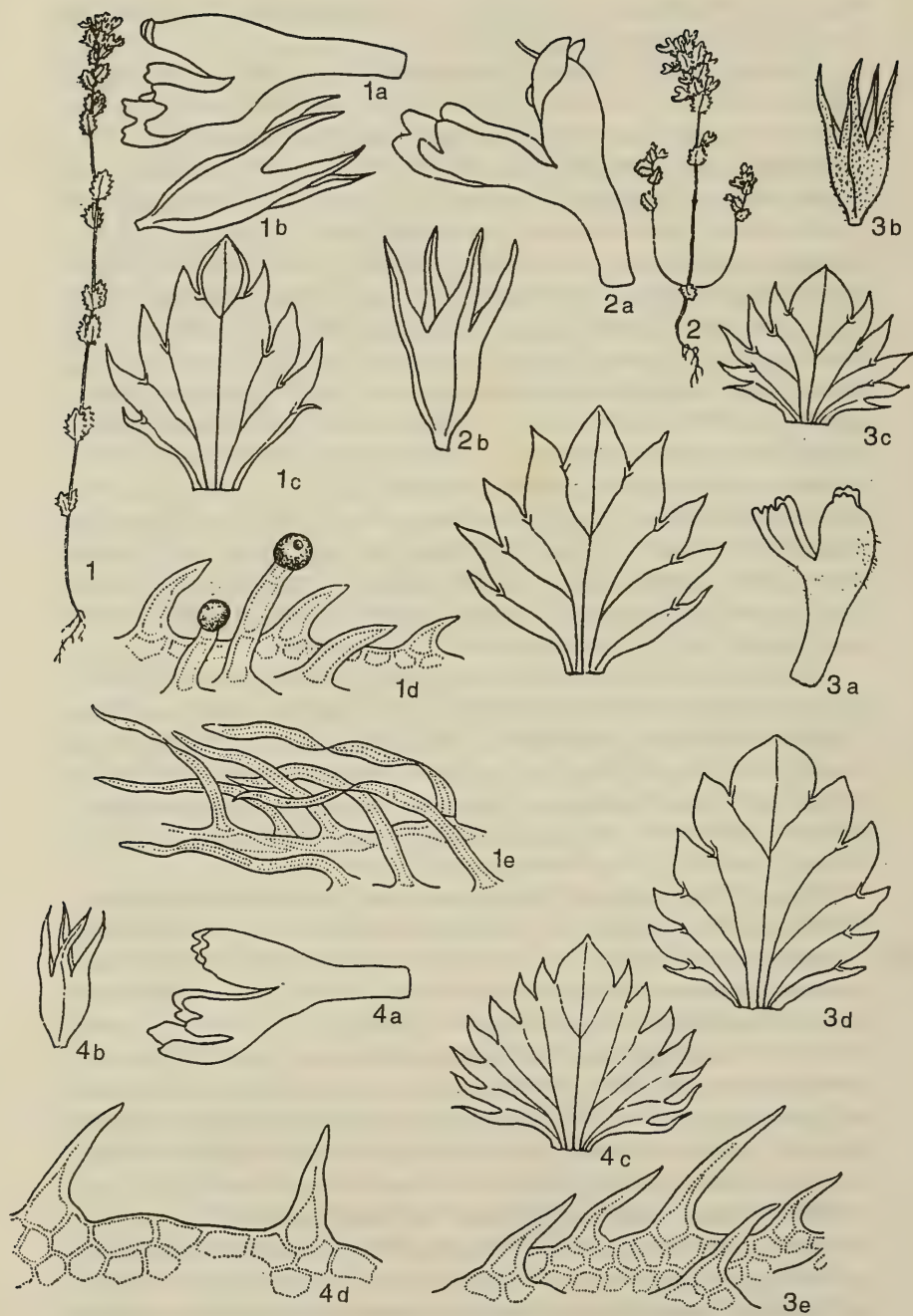
Annual. Stem 5–35 cm tall, erect, simple or branched usually below middle, reddish or brownish, covered in lower part with patent, simple, crispate hairs, leafless by flowering stage; branches erect or erectopatent, sometimes further branched, lower cauline leaves opposite, cuneate, sub-obtuse, with 1–3 obtuse teeth on either side; middle and upper cauline leaves almost opposite, ovate or ovate-lanceolate, broadest in middle, 2 times as long as broad, acute, with 3–5 aristate teeth on either side; floral leaves usually alternate, broader and shorter than cauline, broadest at lower 1/3, ovate, shortly cuneate at base, with 4–7 aristate or short-pointed teeth on either side; all leaves plicate-striated, scattered with short, erect, glandular hairs, especially along veins and margin (at least near base), otherwise glabrous or with somewhat dense, erect bristles. Inflorescence condensed at first, later extremely elongated; flowers sessile. Calyx with pubescence similar to that of leaves, scarcely accrescent in fruit. Corolla 6–10 mm long, with bilobed upper lip; lobes dentate or rarely 2-lobulate; lower lip 3-lobed, with sinuate lobes; corolla pale violet or sky-blue, with yellow spot on lower lip and sky-blue and purple stripes. Capsule cuneate-obovate, narrow, subobtuse, emarginate, equaling calyx or longer, long-ciliate along margin, otherwise pilose or glabrous. July to September.

Thinned forests, scrubs, abandoned fields, meadows, mowed pastures and other grassy places.—*European USSR*: Karelia-Lapland, Ladoga-Ilmen, Dvina-Pechora, Volga-Kama, Baltic Region, Upper Dnieper, Upper Volga, Volga-Don, Middle Dnieper, Upper Dniester, Trans-Volga Region; *Western Siberia*: Ob' Region; *Eastern Siberia*: Yenisey, Angara-Sayan. *General distribution*: Scandinavia, Central and Atlantic Europe (Great Britain). Described from Maritime Alps. Type in Zurich.

*Note*. 1. Despite the disjunct character of the range of this species, already noted by Wettstein (l.c. 113), which apparently, is absent in most of Central Europe (namely in its central zone, where *E. condensata* Jord.) prevails, it has not been possible so far to discover constant differences between the plants of the two parts of its range.

2. V.N. Khitrovo, and S.S. Ganeschin after him, considered that the western *E. brevipila* Burn, and Gr. s. str. is itself a seasonal autumn race, while our (eastern) form is the original summer race, not yet differentiated into two, spring and autumn, races. The original form is named *E. prae-brevipila* Chitr. by V.N. Khitrovo. We could not, however, find clear differences either in the "architectonics" or in the flowering time between our plant, assumed here to be *E. brevipila* and the actual *E. brevipila* Burn. and Gr. (including also the "type"); both of them represent entirely analogical series of forms. On the other hand, whereas the typical spring race of this complex—*E. tenuis* (Brenn.) Wettst.—is very common in the USSR





and is easily recognizable, occurring in a particular habitat (see below), it is impossible to draw any demarcating line between *E. praebrevipila* and "*E. eubrevipila*" and it is practically impossible to separate them. Refer also to opinion of Jörgensen in this respect [Berg. Mus. Aarb. 1916–1917, No. 5 (1919) 19–20]; this author, incidentally, being unacquainted with V.N. Khitrovo's research, cautioned against possible attempts at establishing intermediate summer species in the genus *Euphrasia* (i.e., introducing the idea of "trimorphism" into the taxonomy of the eyebrights).

As regards the opinion recently expressed by the American botanist Callen in the pages of the "Journal of Bot." (XXVIII, 1940, p. 218) that *E. praebrevipila* Chitr. is related, not to series *Brevipilae*, but to series *Latifoliae*, and should be placed alongside *E. minima* Jacq. and *E. pulchella* Kern., we consider it to be based on some misunderstanding.

3. Wettstein's assumption (l.c. p. 159), (highly unlikely in our opinion) that *E. brevipila* could have originated by hybridization as a result of a cross between the original eglandular and long-stalked, glandular forms (i.e., plants of the type of *E. condensata* Jord., on one hand, and *E. hirtella* Jord. or *E. rostkoviana* Hayne, on the other hand), may now be considered as irrelevant.

*E. × murbeckii* Wettst. in Monogr. Gatt. Euphr. (1896) 288 (*E. brevipila* Burn. and Gr.  $\times$  *E. parviflora* Schagerst.).

Annual. Plant intermediate between parent species and somewhat unstable in characteristics, usually showing mixed character of pubescence of leaves composed of dense bristles and comparatively few short-stalked glands. Shape of teeth markedly variable, fluctuating between acute and aristate teeth in *E. brevipila* and subobtuse teeth in *E. parviflora*. In size of flowers, it also occupies an intermediate position between these species. June to Autumn.

587 In places similar to those of the parent species, often together with them, but sometimes in the absence of at least one of them.

*European USSR*: Ladoga-Ilmen, Baltic Region, Upper Volga. Probably found in all regions of common habitat of parent forms. *General distribution*: Scandinavia, Central Europe. Described from Sweden. Type in Stockholm.

#### Plate XXVIII.

1. *Euphrasia regelii* Wettst., general appearance of plant, 1a) corolla, 1b) calyx, 1c) floral leaf, 1d) pubescence of calyx, 1e) pubescence of stem.—2. *E. fedtschenkoana* Wettst., general appearance of plant, 2a) corolla, 2b) calyx, 2c) floral leaf.—3. *E. parviflora* Schagerström, 3a) corolla, 3b) calyx, 3c) floral leaf, 3d) leaf, 3e) pubescence of floral leaf.—4. *E. glabrescens* (Wettst.) Wiinst., 4a) corolla, 4b) calyx, 4c) floral leaf, 4d) pubescence of floral leaf.

*Note.* The eglandular form of this hybrid, which stands closer to *E. parviflora*, is probably *E. tavastiensis* W. Bckr. [Fedde, Repert. XVII (1921) 286], "ex authopsia" unknown to us.

15. *E. tenuis* (Brenn.) Wettst. in Pflanzenfam. IV 3b (1893) 101; Monogr. Gatt. Euphr. 114; Kryl. Fl. Zap. Sib. X, 2483.—*E. officinalis* var. *tenuis* Brenn. Floristik Handbok för larav i Finland. (1886) 145.—*E. brevipila* ssp. *praecox* Ganesch. in Maevsk. Fl. ed. 6 (1933) 610.—*E. suecica* Murb. and Wettst. ex Wettst. Monogr. Gatt. Euphr. (1896) 297.— *Ic.:* Wettst. Monogr. Gatt. Euphr. tab. 11, f. 10.— *Exs.:* Pl. Finl. exs. No. 350; GRF, No. 279.

Annual. Stem 3–30 cm tall, erect, simple or very rarely weakly branched (in upper part), green or reddish, covered with simple, slightly crispate, recurved hairs. Cauline leaves persistent until flowering stage, lower leaves cuneate-obovate, with 1–3 obtuse teeth on either side, obtuse; middle and upper cauline leaves ovate or oblong-ovate, with 3–5 sub-obtuse teeth on either side, separated by intensely elongated internodes; floral leaves shorter and broader than cauline, ovate or broadly ovate, with 3–6 acute or short-aristate teeth on either side; pubescence of all leaves more sparse compared with *E. brevipila*, but hairs and glands similar. Inflorescence shorter than in *E. brevipila* Burn. and Gr.; flowers less in number, first flower appearing at 2–6th node. Otherwise similar to *E. brevipila*, of which it is an early race. End of May to July.

Meadows (flowering before hay-making).—*European USSR:* Karelia-Lapland, Dvina-Pechora, Volga-Kama, Ladoga-Ilmen, Baltic Region, Upper Dnieper, Upper Volga, Volga-Don, Middle Dnieper, Upper Dniester; *Western Siberia:* Ob' Region. *General distribution:* Scandinavia, Central Europe (eastern part). Described from Finland. Type in Helsinki.

*Note.* Plant, typically with the spring habit (see general note for the genus *Euphrasia* L.); in its best expression, highly characteristic, the plant is connected, however, with *E. brevipila* Burn. and Gr. by a series of intermediate forms. The most widely distributed of all our eyebright species of analogous significance, *E. tenuis* is an especially suitable subject for research on the phenomenon of seasonal dimorphism in the genus *Euphrasia*.

16. *E. caucasica* Juz. in Grossh. opred. rast. Kavk. (1949) 317 (nomen); in Bot. mat. Gerb. Bot. Inst. Akad. Nauk. SSSR 588 (1955).—*E. regelii* Wettst. Monogr. Gatt. Euphr. (1896) 81, p.p.—*E. brevipila* Grossh. l.c., non Burn. and Gr.—*E. officinalis*  $\beta$ . *vulgaris* Ldb. Fl. Ross. III (1847–1849) 263.

Annual. Stem 8–35 cm tall, erect, simple or with few, generally much elongated branches diverging at acute angle below middle, usually dull violet or almost brown, sparsely covered with crispate, whitish, generally



retrorse hairs, mixed throughout with short-stalked glands; considerable lower part of stem length leafless by flowering stage. Middle and upper cauline leaves ovate or broadly ovate, broadest below middle, with broadly angled base, acute, with 3-5 acute, aristate, often recurved teeth on either side; floral leaves similar to cauline, but broader, often suborbicular, with up to 6 long aristate teeth on either side; upper surface of all leaves extremely pitted, lower surface with very prominent veins and appearing rugose, green, sparsely covered with short-stalked glands, more dense beneath along veins and also along teeth margin; glands along teeth margin intermixed with short bristles. Inflorescence rather condensed at first, later intensely elongated; flowers sessile (fruiting calyx on short pedicels). Calyx sparsely covered with short-stalked glands, mixed with or without fine bristles, scarcely accrescent in fruit, with long aristate teeth. Corolla comparatively small, 5-7 mm long, whitish, with sky-blue or pale violet upper lip, having dark violet stripes on both lips, with yellow spot at base of lower lip. Capsule oblong, narrow, obtuse, weakly emarginate, diffusely pilose above, long-ciliate along margin, slightly shorter than calyx teeth. August.

Mountain meadows and grass plots, stony slopes, rocks, scrub.—*Caucasus*: Ciscaucasia, Dagestan, eastern Transcaucasia. Endemic. Described from South Ossetia. Type in Leningrad.

*Note.* The assigning of this purely Caucasian plant to *E. regelii* must be considered a serious mistake of the monographer of this genus. *E. caucasica* is well distinguished from *E. regelii* by the different shape of the teeth of the leaves (especially the floral leaves). It is much closer to the European *E. brevipila* Burn. and Gr., from which *E. caucasica* is distinguished essentially only by the smaller flowers.

17. *E. svanica* Kem.-Nath. in Fl. Gruz. VII (1952) 604.—*!c.*: Kem.-Nat. l.c. fig. 355.

Annual. Stem 10-25 cm tall, slender, weak, not branched, with extremely distant nodes. Leaves ovate with cuneate base, with few obtuse or subacute teeth; floral leaves similar to cauline, but with 2-5 acute teeth on either side, teeth aristate in upper floral leaves; pubescence consisting of bristles and short-stalked glands. Flowers appearing from 4-5th node. Inflorescence lax in lower part, dense above. Calyx teeth narrow, lanceolate or linear-lanceolate, acute, long aristate. Corolla rather large, 6-8 mm long, white with sky-blue upper lip and violet stripes on lips, more distinct on upper lip; lower lip slightly longer than upper. Capsule narrow, subcylindrical, longer than calyx. July to August.

Stony deposits in subalpine mountain zone.—*Caucasus*: western Transcaucasia. Endemic. Described from Svanetia near Shtugra Glacier (Ushba Glacier). Type in Tbilisi.

*Note.* Obviously, a high-altitude race of the previous species (*E. caucasica* Juz.)

18. *E. regelii* Wettst. Monogr. Gatt. Euphr. (1896) 81, s. str.; Kryl. Fl. Zap. Sib. X, 2484.—*l.c.*: Wettst. l.c. tab. III, f. 111–119; tab. XI, f. 6.

Annual. Stem 3–30 cm tall, erect, straight, simple or branched in lower or middle part, with erecto-patent, generally short branches, reddish or brownish, covered with whitish, slightly crispate, retrorse hairs, sometimes mixed with few short-stalked glands. Cauline leaves obovate, oblong-rhombic or ovate, with cuneate base, generally obtuse, with 2–4 obtuse or subacute teeth on either side; floral leaves ovate or broadly ovate, broadly cuneate at base, with 3–5 short-pointed but not aristate teeth on either side, or aristate teeth very short and gristly; floral leaves slightly upcurved, somewhat densely covered with short glandular hairs, mixed with scattered simple hairs or bristles. Inflorescence condensed, not much elongated even in fruit; flowers subsessile; pedicels slightly elongated only at final flowering stage. Calyx pubescence similar to that of floral leaves, teeth narrowly lanceolate, acute; calyx accrescent in fruit. Corolla small, dorsally 5–6 mm long with tube elongated at final flowering stage, whitish with violet upper lip and with dark violet stripes; upper lip deeply bilobed, lower 3-lobed, lobes slightly sinuate. Mature capsule elongated-elliptical, equaling calyx or slightly longer, slightly emarginate, ciliate along margin, otherwise pilose. July to August (Plate XXVIII, fig. 1).

Steppes, open mountain slopes, mountain forests, alpine meadows.—*Soviet Central Asia*: Tien Shan, Pamiro-Alai. *General distribution*: Dzh.-Kashgar, Iran (?). Described from Kuldzha (Aristyn). Type probably pre-

590 served in Vienna (?). Isotype in Leningrad.

*Note.* Our description of this polymorphic species basically covers the type material from the central Tien Shan. Material from the western Tien Shan and Pamiro-Alai, partly assigned by Wettstein to this species, includes in addition to typical forms, also several non-typical forms. Especially noteworthy is the abundance in this material of profusely branched plants with only crenate leaves. We are inclined to see in these plants a tendency toward the following species.

19. *E. fedtschenkoana* Wettst. ex B. Fedtsch. Rast. Turkest. (1915) 697, nomen nudum; Juz. in Bot. mat. Gerb. Bot. Inst. Akad. Nauk SSSR XVII (1955).—*E. hirtella* Ostenf. in sched. herb. Paulsenii, non Jord.

Annual. Stem erect or ascending, slender or somewhat thick, 2.5–15 cm tall, simple or branched in lower part, with few or rather numerous, erect, slightly flexuous branches, green or reddish, covered with simple, slightly crispate, whitish hairs mixed with short-stalked glands.

Lower cauline leaves small, cuneate-obovate, obtuse, with 1–2 obtuse teeth on either side; upper cauline leaves similar, but larger and broader, broadly ovate, narrowed at base into very short petiole, with 2–4 teeth on either side; floral leaves similar to upper cauline, but larger, sessile, with 4–5 often somewhat pointed (but not aristate) teeth on either side; all leaves fairly, but not densely, covered with short-stalked glands, their teeth, in addition, with short bristles. Inflorescence short and rather dense at first, later intensely elongated, few-flowered; flowers on short pedicels, elongated in fruit up to 4 mm. Calyx with acute, but not aristate, teeth, with scattered short-stalked glands, with short bristles along teeth margin, scarcely accrescent in fruit. Corolla small, 5–6 mm long, up to 7 mm by final flowering stage, whitish, often with pale sky-blue upper lip, with narrow sinuate lobes of lower lip, Capsule cuneate-oblong, equaling, but not exceeding calyx teeth, with rounded tip, shallowly emarginate, sparsely somewhat long-ciliate. July (Plate XXVIII, fig. 2).

Habitat not known.—*Soviet Central Asia*: Pamiro-Alai. Described from Shugnan, between the localities of Dzhilanda and Van-Kala (Sardym). Endemic. Type and isotype in Leningrad.

*Note.* The position assigned to this species in the classification cannot  
591 be considered as definitive. Its features, similar to species of series *Peti-olares* Pugsl. or, to be more precise, with isolated representatives from Soviet Central Asia, attract attention. Since, however, *E. fedtschenkoana* is found in places where *E. schugnanica* Juz., assigned by us to series *Petiolares*, grows, and with which moreover, it apparently hybridizes, we prefer to place it alongside a representative of another series, *Brevipilae* Pugsl., namely, *E. regelii* Wettst., with which, it seems to us, it is closely connected genetically (see note on *E. regelii*).

Series 3. *Boreales* Juz.—Subarctic and arctic species, similar to species of the above-mentioned series, but with non-aristate or very short-aristate teeth on the floral leaves, the latter, as a rule, eglandular. Corolla rather large or of medium size. Calyx in fruit distinctly accrescent.

*Note.* In Pugsley's system, the species heading this series, *E. boreales* (Townsend) Wettst. and *E. hyperborea* Jörgens., are assigned to series *Brevipilae*, which seems to us rather far fetched. We preferred to separate these forms and add to them some others, forming another series, seemingly intermediate between series *Brevipilae* and *Latifoliae*.

20. *E. hyperborea* Jörgens. in Berg. Mus. Aarb. 1916–1917 (1919) 255.—*l.c.*: Jörgens. l.c. f. 51–54, tab. VII.

Annual. Stem 5–22 cm tall, simple or very rarely with isolated short branches in middle part, green or brownish above, sparsely covered with fine, recurved hairs. Cauline leaves few, 1–3 pairs, very distant, lower cuneate-obovate, obtuse, with 1–2 obtuse teeth on either side; upper cauline leaves



ovate or obovate, obtuse, with 2–3 short obtuse teeth on either side, upper tooth very broad; floral leaves shorter and broader than upper cauline leaves, broadly ovate, with 3–5 generally subacute teeth on either side and with obtuse or subacute upper tooth; all leaves bright green, flat, with cuneate base, or with very short petiole, diffusely puberulent or rarely pilose along leaf margin and veins beneath, very rarely with isolated short-stalked glands. Inflorescence short, few-flowered, almost not elongated by final flowering stage; flowers short-pedicellate. Calyx with pubescence similar to that of leaves, with hairs distributed mainly along veins, scarcely accrescent in fruit, with lanceolate, acute, but not aristate, teeth. Corolla comparatively large (6–10, usually 8 mm), often with distinctly elongated tube by final flowering stage, with pale violet or sky-blue upper lip and whitish lower lip, with dark violet or dark blue stripes and yellow spot. Capsule elliptical or narrowly obovate, deeply emarginate. Seeds large, few (2–4). August.

Damp meadows and other grassy places, birch woods.—*Arctic Region*: Arctic Europe; *European USSR*: Karelia-Lapland? *General distribution*: Scandinavia (Norway). Described from Tromsø Island. Type in Bergen.

*Note*. S.S. Ganeschin identified this species from a collection from Kildin Island and also from Karelia-Lapland and Dvina-Pechora. Not having seen authentic specimens of *E. hyperborea*, we cannot confirm the accuracy of S.S. Ganeschin's identification; his identification of the plants from Dvina-Pechora, in any case, is doubtful.

Small-flowered plants of *E. hyperborea*, according to Jørgensen's evidence, are very similar to *E. frigida* Pugsl., with which, however, it can hardly be connected directly, being first of all an arctic derivative of *E. borealis* (Townsend) Wettst., which is absent in flora of USSR.

21. *E. saamica* Juz. in Bot. mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVII (1955).

Annual. Stem 6–20 cm tall, erect, slender or rather thick, simple or with isolated obliquely erect branches, brownish violet, sparsely covered with whitish, crispate, recurved hairs. Culine leaves 2–6 pairs, lower cuneate obovate, obtuse, with 1–2 subobtuse teeth on either side; floral leaves ovate or broadly ovate, cuneate at base, acute or short-pointed, with 3–4 teeth on either side; teeth somewhat large, rather deeply parted, dissimilar, often very narrow, acute or short-pointed, often variably, curved, without aristate tip or very often distinctly short-aristate; all leaves flat, covered along margin and beneath, mainly along veins, with scattered, minute, short whitish bristles, sometimes mixed with isolated, very minute, short-stalked glandular hairs; otherwise leaves glabrous. Inflorescence by final flowering stage elongated, with somewhat distant nodes; flowers sub-sessile. Calyx with pubescence similar to that of leaves, with narrow, short-aristate teeth, markedly accrescent in fruit, pedicels short. Corolla 7–10 mm long, tube almost not elongated

later, with 3-lobed lower lip, much longer than violet upper lip; lower lip with yellow spot and violet stripes. Capsule elliptical, emarginate, not exceeding or scarcely longer than calyx. August.

Forests (open spruce forests, winding birch woods), meadows, scrub.—*European USSR*: Karelia-Lapland. Endemic? Described from Khibiny Mountains. Type in Leningrad.

593 *Note.* Until now, this species, extremely common in the Khibinskie Mountains, and perhaps in other regions of the Kola Peninsula, was accepted as *E. frigida* Pugsl. (*E. latifolia* Wettst.); we observed it occurring in direct proximity to the latter but thanks to its large flowers and the different character of the leaf dentation, hesitate to place these two species of Kola Peninsula alongside each other in the classification. The relation of *E. saamica* to the other species of series *Boreales*, where we have placed it, is so far problematical.

22. *E. subpolaris* Juz. in Bot. mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVII (1955).

Annual. Stem 4.5–20 cm tall, erect, usually slightly curved or flexuous, simple or with few, often rather long, flexuous branches, diverging at acute angle, in lower and middle parts of stem, stem generally well developed, usually somewhat reddish, covered with white, recurved, crispate hairs. Cauline leaves often very distant, few, often alternate; leaves ovate or oblong, cuneate at base, obtuse, with few large, obtuse or subobtuse teeth, 1–4 on either side and with somewhat large, usually rounded tooth at tip, persistent until flowering stage; floral leaves crowded only at early flowering stage, later much separated and not imbricate, similar to cauline leaves in shape, or scarcely broader, but larger, crenate or sharply toothed, often with 3–6 short-pointed teeth on either side; all leaves dark green, covered (mainly along margin and veins beneath) with generally scattered, short and fine, usually patent bristles. Flowers appearing at 3–5th node, short-pedicellate. Calyx pubescence similar to that of leaves, uniform but not dense; teeth narrow, rather long, acute, often distinctly aristate; calyx in fruit weakly accrescent. Corolla medium in size, often much exceeding bracts, 6–8(10) mm long, with tube scarcely elongated after flowering, whitish with weakly colored, pale bluish violet upper lip; lower equaling or slightly exceeding upper. Capsule oblong-elliptical, emarginate, pilose, ciliate along margin, usually equaling calyx. July to August.

Banks of rivers.—*Eastern Siberia*: Yenisey, Lena-Kolyma, Dauriya. Endemic. Described from lower reaches of Lena River. Type in Leningrad.

594 *Note.* This species which in accordance with Wettstein's monograph, has been treated until now as *E. frigida* Pugsl. (*E. latifolia* Wettst.), actually differs from it by the more elongated, lax inflorescence, longer acuminate teeth of the floral leaves and calyces and larger flowers on distinct pedicels. Wettstein, however, judging from his own words, did

not see specimens of this form, and, while accepting the occurrence of "*E. latifolia*" in Siberia, relied exclusively on Herder's evidence. We should note that the features distinguishing *E. subpolaris* from *E. frigida* are ones that draw the species rather close to *E. tatarica*, or, more correctly to *E. jacutica*, which we consider intermediate to some extent between *E. tatarica* and *E. subpolaris*.

Series 4. *Jaeschkeanae* Juz.—Asiatic species similar to those of series *Brevipilae*, but with stem densely pubescent with somewhat long-stalked glandular hairs. Teeth of leaves generally acute or obtuse, not aristate. Flowers medium in size or often rather large.

*Note.* Like *E. borealis* (Townsend) Wettst. (see above) Pugsley refers *E. jaeschkei* Wettst., heading this series, to series *Brevipilae*. Our attempt here is to separate *E. jaeschkei*, along with some other forms, into a separate series intermediate to a certain extent between the series *Brevipilae* and *Hirtellae*.

23. *E. bajankolica* Juz. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XVII (1955).

Annual. Stem 4–35 cm tall, erect, usually bent or flexuous, simple or often branched in middle or almost throughout its length; branches generally, elongated, obliquely erect, flexuous, sometimes branched in turn; stem often violet, densely covered with white, crispate, recurved hairs, usually mixed with rather long-stalked glands. Cauline leaves elliptical or ovate, narrowed into short petiole at base, subacute, with 2–4 subobtuse, often dissimilar teeth on either side; floral leaves similar to cauline, but larger and broader, with 3–5 generally subacute or acute, but not aristate, teeth on either side; all leaves bright green, rather densely covered with 2–3-cellular short-stalked glands, mixed with simple short bristles, especially dense along teeth margin. Inflorescence short and condensed at first, later intensely elongated and with rather distant nodes in lower part; flowers on somewhat long pedicels. Calyx rather densely pubescent with simple and glandular hairs, rarely subglabrous, with somewhat short, rather broad, short-aristate, subacute teeth, moderately accrescent in fruit. Corolla somewhat large, 8–11 mm long, with slightly elongated tube at  
595 final flowering stage, white, with pale lilac upper lip, dark bluish violet stripes with yellow spot on long protruding lower lip, sparsely pubescent outside. Capsule oblong-elliptical, slightly shorter than calyx teeth, covered with somewhat long hairs, only slightly shorter than cilia along teeth margin. July to August.

Forests (spruce), forest glades.—*Soviet Central Asia*: Tien Shan (Terskei Ala-Tau). Described from Bayankol Ravine. Type in Leningrad.

*Note.* Apart from stem pubescence, *E. bajankolica* is well distinguished from *E. regelii* Wettst., by the generally pedicellate, large flowers.



Of our species assigned by us to series *Jaeschkeanae* this species has the most clearly developed characteristics of series *Hirtellae*. We, however, are not inclined to consider it of hybrid origin.

24. *E. cyclophylla* Juz. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XVII (1955).

Annual. Stem erect, straight, simple or with few weak, obliquely erect branches in lower or middle part, 5–25 cm tall, reddish or violet, rather densely covered with whitish, crispate, recurved hairs, mixed with rather long-stalked glands, especially dense under inflorescence nodes. Cauline leaves broadly elliptical or broadly ovate to suborbicular, subsessile, with very broad cuneate or orbicular base, obtuse or rounded at tip, with 3–4 very obtuse or rounded teeth on either side; floral leaves similar to cauline, but larger, often slightly cordate at base, with 3–5 short and broad, obtuse or subacute teeth on either side; all leaves bright green or often turning purple beneath, evenly covered with glands; glands generally with 2-cellular stalks, but mixed with 3–4-cellular-stalked glands at leaf base. Inflorescence condensed at first, with imbricate floral leaves, often completely covering calyces, later with much elongated internodes and interrupted in lower part; flowers distinctly short-pedicellate. Calyx rather densely glandular-pubescent, with mixture of somewhat short bristles and with large, subacute or subobtuse teeth, accrescent in fruit. Corolla small, about 7 mm long, whitish, with pale violet upper lip and dark bluish violet stripes; lower lip with narrow lobes, distinctly exceeding upper. Capsule (raw) elliptical, weakly emarginate, nearly equaling calyx, shortly appressed pilose, long-ciliate along margin. End of June to July.

In wooded ravines.—*Soviet Central Asia*: Pamiro-Alai (Alai foothills). Endemic. Described from mouth of Katta-Karamuk River, and from valley of Isfairam River opposite mouth of Kainda River. Type in Leningrad.

596 This plant is well distinguished from *E. regelii*, according to what the collector adopted, by the presence of long-stalked glands in the pubescence of the stem, the form and character of the leaf dentation and the larger flowers. It should be compared with the Himalayan species *E. jaeschkei* Wettst., to which it is more similar; the latter is distinguished, however, from *E. cyclophylla* by the short-pointed teeth in the upper cauline and floral leaves, the abundance of somewhat long, simple hairs in the pubescence of the leaves and calyx and by the larger flowers (up to 10 mm). Features distinguishing this species from *E. bajancolica* are mentioned in the key.

25. *E. tranzszelii* Juz. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XVII (1955).

Annual. Stem erect or ascending, usually slightly flexuous, simple or, as a rule, branched in lower or middle part, with generally elongated, well

developed, flexuous branches, 4–50 cm tall, generally reddish or dark purple, covered with whitish, slightly crispate, recurved hairs, sparsely mixed with comparatively long-stalked glands, more densely under inflorescence nodes. Cauline leaves numerous (flowers appearing at 5–9th node), sessile, ovate or subrhombic, orbicular or broadly cuneate at base, obtuse, with numerous, minute, obtuse or subobtuse, rounded or deltoid (often rectangular) teeth, 4–7 on either side; floral leaves similar to upper cauline, but slightly longer and broader, with more acute or even slightly short-pointed non-aristate teeth, 5–7 on either side; all leaves almost flat, covered with scattered or rather dense short-stalked glands, also with bristles along leaf margin. Inflorescence short, lax at first, later intensely elongated and profusely flowered, but with comparatively short distance between nodes; flowers distinctly pedicellate, pedicels comparatively short (up to 2 mm long). Calyx densely covered with short-stalked glands, hispidulous besides on teeth, narrowly obconical, with long, acute teeth scarcely shorter than 1/2 calyx teeth, almost non-acrescent in fruit. Corolla 6–10 mm long, with tube not elongated or scarcely so by  
 599 final flowering stage, whitish; upper lip obscurely colored, lower rather large and broadly lobed, much exceeding upper, very sparsely pubescent outside. Capsule narrow, oblong-elliptical, subobtuse, scarcely emarginate, shorter than calyx teeth, sparsely pilose, ciliate along margin. June to July.

Meadows and riverine valleys.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from vicinity of Gulcha. Type in Leningrad.

*Note.* This species was considered by S.S. Ganeschin as *E. regelii*, from which, however, it is well distinguished by the presence of long-stalked glands in the pubescence of the stems, the shape and character of the leaf dentation, and the much larger flowers. From related *E. cyclophylla* Juz. it is also well distinguished by the shape of the leaves and their teeth, the size of flowers and also the sharper calyx teeth.

26. *E. krassnowii* Juz. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XVII (1955).

Annual. Stem 4–9 cm tall, erect, simple, covered with whitish soft, recurved hairs and very minute short-stalked glands, perhaps reddish when alive, internodes somewhat elongated. Cauline leaves few, elliptical, obtuse, with 1–2 obtuse teeth on either side, caducous. Bracts somewhat spaced, broadly ovate, with broadly cuneate or suborbicular base, obtuse or subobtuse, with 2–4 broad, subobtuse or acute, non-aristate teeth on either side; all leaves sparsely covered with short, somewhat fine bristles mixed with minute short-stalked glands, denser only along leaf margin and veins beneath. Flowers appearing at 3rd node, sessile. Calyx pubescent along teeth margin and veins, sometimes pubescent throughout, similar to leaves, with broad acute teeth terminating into very fine arista, apparently accrescent in fruit. Corolla comparatively large, about 1 cm long, with bilobed upper lip and 3-lobed

lower, of normal structure, apparently whitish, with lilac stripes. Capsule (raw) shorter than calyx teeth, obovate, emarginate, densely patently ciliate along margin. July (?)

In subalpine zone.—*Western Siberia*: Altai mountains. Endemic. Described from Katunskie Belki. Type in Leningrad.

*Note.* This species, related to series *Jaeschkeanae*, is more similar in appearance to the species of series *Latifoliae* Pugsl. and partly to *E. frigida* Pugsl., from which, however, it is distinguished by the glandular pubescence of the stem and leaves and by the large flowers; from *E. altaica* Serg., it is distinguished by the glandular pubescence and broader leaves and bracts, while from *E. drosophylla* Juz. by the more developed glandular pubescence of the stem the elongated inflorescence with distant internodes and the corolla two times as large, and also probably by the shorter and broader capsule. The closeness of this species to the preceding species which tend more toward *E. jaeschkei* Wettst., is somewhat tentative, we should mention that this species was collected only once, and urgently needs further collection.

Series 5. *Nemorosae* Pugsl. in Journ. Linn. Soc. Bot. XLVIII (1930) 494.—Generally profusely branched plant, flowering in autumn. Leaves hispid or subglabrous. Corolla small, lower lip exceeding upper. Capsule somewhat broad, emarginate.

27. *E. parviflora* Schagerström, Conspl. veg. Upland. (1845) 56; Fries, Summa veg. Scand. I, 195, p.p.: Babingt. in Journ. Linn. Soc. XI, 320; Trautv. Incrém. Fl. Ross. 589.—*E. curta* Wettst. in Oesterr. Bot. Zeitschr. XLIV (1894) 135; Monogr. Gatt. Euphr. 128.—*E. officinalis*  $\delta$ . *curta* Fr. in Fr. and Broberg. Fl. Halland (1817) 104.—*E. officinalis*  $\gamma$ . *curta* Hartm. Handb. Skand. Fl. (1861) 67; Knapp. Pfl. Galiz. u. Buk. 231 (sub  $\delta$ ).—*E. officinalis* B. *montana*  $\delta$ . *curta* Fr. Nov. Fl. Suec. ed. 2 (1828) 198.—*E. parviflora* var. *curta* Fr. l.c. 19, p.p.—*E. officinalis* A. *platyphyllae*  $\beta$ . *curta* Rchb. Ic. fl. Germ. XX (1862) 58.—*E. curta* var. *glabrescens* Wettst. Monogr. Gatt. Euphr. (1896) 133, p.p.—*E. praecurta* Chitr. in Spisok rast. Russk. fl. V (1905) 146.—*l.c.*: Rchb. l.c. tab. 1732, f. VI; Wettst. Monogr. Gatt. Euphr. tab. IV, f. 185–193; tab. VII, f. 11.—*Exs.*: Schultz, Herb. norm. No. 1111 and 1111 bis; Meinsh. Herb. Fl. Ingr. No. 469; Fr. Herb. norm. VI, No. 26 (sub *E. officinalis*\* *curta* Fr.); Dörf. Herb. norm. No. 3357 and No. 3358.

Annual. Stem 3(7–15) 40 cm tall, erect, thick or rarely rather slender, branched generally in lower part up to middle, reddish or brownish, covered with crispate, white, recurved hairs, with erect or erecto-patent, opposite branches, sometimes again branched in turn. Lower leaves obtuse, with 1–3 obtuse teeth on either side; middle and upper leaves ovate, acute, broadest at base, with 4–7 acute, non-aristate teeth on either side; floral leaves almost opposite, broader and shorter than cauline leaves, often suborbicular, with 4–7 acute, non-aristate or short-aristate teeth on either side; all leaves grayish





601 green, rugose beneath when dry, often blackening, covered on both surfaces, as a rule, by somewhat dense, white hairs. Inflorescence condensed at first, later elongated (usually, however, moderately); flowers subsessile. Calyx white-hispid throughout or only along margin and veins, slightly inflated in fruit, with short teeth. Corolla 4–5 mm long, upper lip bilobed with sinuate or serrulate lobes; lower lip 3-lobed, with sinuate lobes; corolla whitish with blue veins and yellow spot on lower lip, rarely sky-blue or pale violet throughout. Capsule cuneate-obovate, equaling or scarcely exceeding calyx when mature, truncate or obscurely emarginate, long-ciliate along margin, otherwise pilose or rarely glabrous. July to October (Plate XXVIII, fig. 3)

Scrub, pastures, abandoned fields and their edges.,—*European USSR*: Baltic Region, Ladoga-Ilmen, Dvina-Pechora?, Volga-Kama?, Upper Dnieper, Upper Volga, Middle Dnieper?. *General distribution*: Scandinavia, Central Europe, Atlantic Europe (Great Britain). Described from Sweden, Type, probably, in Stockholm.

*Note*: 1. A western species with the typical "autumn" late-flowering habit; unbranched or sparsely branched, comparatively early-flowering plants of *E. parviflora* are relatively rare, Similar plants, though collected at an early-flowering stage, but sufficiently late (on 19th August) and, moreover, flowering at same altitude as *E. parviflora*, were published in the GRF under No. 1578 V.N. Khitrovo, as a separate summer species under the name *E. praecurta* Chitr. We think that such a species does not actually exist in nature even in the USSR.

2. Reports of *E. parviflora* (*E. curta*) from regions farther east of the above-mentioned range of its distribution in USSR are doubtful and belong mostly to other species [*E. glabrescens* (Wettst.) Wiinst., form of *E. tatarica* Fisch.].

28. *E. uechtritiziana* Jung. and Engl. in Oesterr. Bot. Zeitschr. XVII (1867) 141.—*E. coerulea* Tausch. in sched. ad pl. select. Bohem. (1837), nomen seminudum; A. Kern. in sched. ad Fl. exs. austro-hung. No. 149; Wettst. in Oesterr. Bot. Zeitschr. XLIV, 95; Monogr. Gatt. Euphr. 115.—*E. officinalis* γ. *coerulea* Tausch. in Ott, Cat. d. Fl. Böhm. (1859) 13.—*Ic.*: Wettst. Monogr. Gatt. Euphr. tab. IV, f. 162–168 and tab. VII, f. 9.—*Exs.*: Schultz, Herb. norm. n. s. No. 875, Kern. Fl. exs. austro-hung. No. 149.

#### Plate XXIX.

1. *Euphrasia frigida* Pugsl., general appearance of plant, 1a) corolla, 1b) calyx, 1c) floral leaf.—2. *E. drosophylla* Juz. 2a) floral leaf, 2b) pubescence of floral leaf.—3. *E. amblyodonta* Juz., general appearance of plant, 3a) corolla, 3b) calyx, 3c) floral leaf, 2. pubescence of floral leaf.—4. *E. mollis* (Ldb.) Wettst., 4a) floral leaf, 4b) pubescence of floral leaf, 4c) pubescence of calyx.

Annual. Stem erect, 5–20 cm tall, simple or sometimes weakly branched, reddish or brownish, covered with simple, slightly crispate, recurved hairs. Cauline leaves opposite, persistent up to flowering stage, lower leaves cuneate or cuneate-obovate, obtuse, with 1–3 obtuse teeth on either side, middle and upper leaves ovate or oblong-ovate, with 3–5 non-aristate teeth on either side; floral leaves similar to cauline, but broader and with sharper, also non-aristate teeth; all leaves pubescent similarly to *E. parviflora*, very rarely with isolated short-stalked hairs. Inflorescence condensed at first, later interrupted, but few-flowered; flowers of typical shape, reddish violet, rarely white; in other features similar to *E. parviflora*, of which it is often recognized as an early race. June.

Meadows, roadsides, ditches. *European USSR*: Upper Dnieper, Upper Dniester. *General distribution*: Central Europe (eastern part). Described from mountains along Izer. Type, probably, in Warsaw.

*Note*. Species of doubtful taxonomic position, usually considered, as noted, as a spring race of *E. parviflora*; its actual relation to the latter, however, is not quite clear. In any case, its area of distribution is quite different from that of *E. parviflora*. As already mentioned by Wettstein, quite different plants very often are called as *E. uechtriziana* (*E. coerulea*); therefore reports of it, particularly from various regions of European USSR, should be treated with great caution. It should be mentioned that this race has been cited by various authors for several regions of the flora of USSR besides the two mentioned above, but these reports, as a rule, are doubtful and the corresponding herbarium specimens are found to belong actually to other forms. Thus, plants from the Velikolutsk District of Pskov Region, distributed in GRF under No. 1580 with V.N. Khitrovo's identification, probably are hybrids between *E. tenuis* f. *subeglandulosa* and *E. parviflora* Schagerst.

29. *E. glabrescens* (Wettst.) Wiinst. in Bot. Tidskr. 48, 1 Hf. (1946) 101–102.—*E. curta* var. *glabrescens* Wettst. Monogr. Gatt. Euphr. (1896) 133, saltem p. max. parte.—*E. varians* Ganesch. in sched.—*Exs.*: GRF, No. 1577.

Annual. Stem 4–25 cm tall, erect, somewhat slender or rather thick, simple or profusely long-branched, mainly in lower 1/2 with erectopatent, generally flexuous, simple branches, reddish or brownish violet, covered with short and somewhat long, white, recurved bristles, longer and slightly crispate in upper part of stem. Lower cauline leaves elliptical or ovate, obtuse, with 1–3 subobtuse or obtuse teeth on either side; middle and upper cauline leaves ovate or broadly ovate, broadest below middle, acute, with 4–7 acute or short-aristate teeth on either side; floral leaves broadly ovate or suborbicular, also with 4–7, but rather long-aristate teeth on either side; all leaves dark green, somewhat shiny when fresh, often blackening



when dry, paler beneath, with very prominent veins, almost striate-plicate, covered above generally near margin, beneath along veins, with scattered, short, simple, unicellular bristles, rarely diffusely pilose throughout or subglabrous and with short bristles only along teeth margin. Inflorescence condensed at first, later (often rather intensely) elongated; flowers subsessile. Calyx hispid mainly along teeth margin and veins, scarcely inflated in fruit, somewhat long, with aristate teeth. Corolla 4–6 mm long, whitish, with dark blue or violet veins, and with yellow spot on lower lip. Capsule cuneate or obovate, truncate or subemarginate, long-ciliate along margin, otherwise diffusely pilulose, equalling calyx when mature, generally somewhat shorter than calyx teeth, sometimes scarcely exceeding calyx. July to August (Plate XXVIII, fig. 4).

Meadows, grass plots and pastures, forest edges (mainly coniferous and mixed), roadsides.—*European USSR*: Ladoga-Ilmen, Upper Dnieper, Upper Volga, Middle Dnieper, Dvina-Pechora, Volga-Kama. *General distribution*: Scandinavia, Central Europe. Described from various points of the range of the species. Type not established so far.

*Note*. The plant seems to be intermediate between *E. parviflora* and *E. brevipila* var. *eglandulosa*; it is more similar to *E. parviflora*, but is distinguished from it in general by weaker branches, strongly reduced pubescence, especially by the distinctly aristate teeth of the floral leaves and calyces, and by the somewhat larger flowers. While describing it under the name *E. varians*, S.S. Ganeschin assumed it to be a hybrid or of hybrid origin. Apparently, however, it has its own identity and in some places replaces *E. parviflora*, especially east of the latter's range. We take as a basis the material described above, determined by S.S. Ganeschin as *E. varians*, but do not find reliable differences in it from Western European *E. glabrescens* even from the author's description of the latter species (for *E. glabrescens* he has indicated, incidentally, the corolla length as 4 mm). S.S. Ganeschin, judging from his notes on the herbarium specimens, also acknowledged the identity of his *E. varians* with *E. curta* var. *glabrescens* Wettst.

Series 5. *E. micranthae* Juz.—Well developed plants often with filiform stems. Leaves glabrous, shining, generally disproportionately small. Corolla small. Capsule emarginate.

30. *E. micrantha* Rchb. Fl. Germ. exc. (1831–1832) 358; Wettst. in Pflanzenfam. IV, 3b. 101.—*E. officinalis* γ. *gracilis* Fr. in Fries and Broberg, Fl. Halland (1817) 104.—*E. gracilis* Fr. Nov. Fl. Suec. Mant. III (1842) 143; Summa veg. Scand. I, 195; Trautv. Increment. Fl. Ross. 589; Wettst. Monogr. Gatt. Euphr. 143.—*E. rigidula* Jord. Pug. pl. nov. (1852) 134.—*lc.*: Rchb. Ic. fl. Germ. and Helv. XX, tab. 1732, f. IV, V and VI; Wettst. Monogr. Gatt. Euphr. tab. IV, f. 216–222, tab. VIII, f. 2 and

3.—*Exs.*: Schultz. Herb. norm. No. 1112, saltem p.p.: Baenitz, Herb. Eur. No. 3788; Dörf. Herb. norm. No. 3360 and 3361; Fl. Finl. exs. No. 390; Woloszcz. Fl. pol. exs. No. 555.

- 604 Annual. Stem 3–30 cm tall, erect, straight, slender (often filiform) simple or with few opposite, erect, filiform branches in middle, glabrous or covered with scattered, short, whitish, slightly crispate, simple hairs, reddish or brownish with leaves (even lowest) persistent up to flowering stage. Lower leaves cuneate, obtuse, with 1–3 subobtuse teeth on either side; middle and upper leaves ovate, acute, broadest near base, with 3–4 acute, non-aristate teeth on either side; floral leaves almost opposite, broader, but shorter than cauline leaves, broadest near base, with 3–5 acute or (rarely) short-aristate teeth on either side, erect or erecto-patent like other leaves; all leaves small, much shorter than internodes, green or reddish, entirely glabrous, shining in dry samples, not plicate, often blackening. Inflorescence condensed at first, later intensely elongated; flowers subsessile. Calyx glabrous, somewhat inflated in fruit, with short, acute teeth. Corolla about 4–6 mm long, with bilobed upper lip, lobes entire or slightly denticulate; lower lip 3-lobed, lobes narrow, sinuate; corolla subglabrous outside, whitish, with blue stripes and yellow spot on lower lip or with pale sky-blue upper lip, or bluish or violet throughout. Capsule linear-obovate, equaling or exceeding calyx, emarginate, ciliate along margin, otherwise glabrous. June to September.

Moors.—*European USSR*: Baltic Region. *General distribution*: Scandinavia, Central Europe. Described from Germany. Type in Vienna.

*Note*. 1. Pugsley assigned this peculiar species to his series *Latifoliae*: to support him in this respect would be to concede too wide a range to the latter series. We preferred to segregate *E. micrantha* into a special series with a typically Atlantic range. In addition to this species, the series should include, apparently, also *E. foulaënsis* Towns. (Shetland Islands) and *E. atripurpurea* (Rostrup) Ostenf. (Faroe Islands). *E. scottica* Wettst., which is close to *E. micrantha*, probably has a hybrid origin (it occupies an intermediate position between *E. micrantha* and *E. frigida* Pugsl.).

2. In the territory of USSR, we know *E. micrantha* only from the Baltic Region. It is true that the Herbarium of the Botanical Institute of the Akad. Nauk SSSR has material from Leningrad Province and the Upper Volga Region (Torzhok) under the name *E. gracilis* f. *pilifera* Ganesch. In our opinion, it cannot be referred to *E. micrantha*, being a form or hybrid of *E. parviflora*.

- 605 Series 6. *Latifoliae* Pugsl. Rev. Brit. Euphr. in Journ. Linn. Soc. Bot. XLVIII (1930) 486.—Plant well developed, generally sparsely branched, often stunted. Leaves generally subglabrous or sparsely pubescent, rarely partly glandular, densely so in exceptional cases, with

non-aristate, often obtuse teeth. Corolla small or medium in size. Capsule somewhat broad, subobtuse or emarginate.

31. *E. frigida* Pugsl. in Journ. Linn. Soc. Bot. XLVIII (1930) 490, in adnot.—*E. latifolia* Pursh, Fl. Am. sept. II (1814) 430, p.p. non L.; Wettst. Monogr. Gatt. Euphr. 136; Jörg. l.c. (1919) 99—*E. arctica* auct. plur. vix autem Lge.; Kryl. Fl. Zap. Sib. X, 2480.—*E. officinalis* Lge. Overs. ov Grönl. Fl. (1880) 79, non L.; Schmalh. Fl. II, 290, p.p.—*E. officinalis*  $\gamma$ . *alpestris* b. *arctica* Herder in Bull. Soc. Nat. Mosc. (1884) 3, 46.—*E. officinalis*  $\beta$ . *vulgaris* Ldb. Fl. Ross. III (1847–1849) 263.—*E. minima* Wettst. l.c. 151, p.p. and auct. plur. Scand. and Ross. non Jacq.—*l.c.*: Fl. Dan. No. 2910; Wettst. l.c. tab. IV, f. 194–199; tab. XI, f. 11 and 12; Jörg. l.c. tab. VIII, f. d–i, tab. IX, f. c–e, l–n, s–v.—*Exs.*: Dörf. Herb. norm. No. 4736, No. 5148; Pl. Finl. exs. No. 1327, 1328, 1329.

Annual. Stem 5–18(25) cm tall, erect or partially ascending, single or with few (1–3) slender, erect branches in lower part or middle, sometimes profusely branched from base with intensely elongated branches, covered with whitish, slightly crispate, recurved hairs, green, reddish or brownish, with elongated internodes. Cauline leaves generally rather distant, few, often alternate, very rarely internodes reduced and leaves approximate; leaves ovate or cuneate-obovate, obtuse, with 1–4(5) obtuse lateral teeth on either side and large rounded apical tooth, comparatively late-shedding; floral leaves, in contrast, approximate, generally imbricate, broader and usually larger than cauline leaves, somewhat broadly ovate or suborbicular, cuneate at base, subobtuse or short-pointed, with 3–6 large, deeply incised and more acute teeth on either side; teeth sometimes acuminate, but not aristate; all leaves covered, throughout or only along margin and veins beneath, with minute, fine white bristles, often mixed with very minute glandular hairs, rarely subglabrous, smooth or slightly rugose when dry. Flowers often appearing from 2nd to 4th node, subsessile. Calyx pubescent along veins and on teeth, (sometimes very weakly) or throughout, pubescence similar to leaves, with broad, usually obtuse teeth, accrescent in fruit. Corolla small or medium in size, scarcely exceeding bracts, dorsally 5–7 mm long, with tube not elongated after flowering stage; upper lip bilobed with spreading toothlike lobes, lower lip 3-lobed with sinuate lobes, usually whitish, with lilac or pale sky-blue upper lip, with yellow spot and dark lilac stripes on lower lip; upper lip comparatively narrow; lower lip longer, with middle lobe narrower and longer than lateral lobes. Capsule large, 5–8 mm long, oblong-elliptical, somewhat deeply emarginate, pilose, patently ciliate along margin, generally much longer than calyx, rarely equaling it, distinctly pedicellate. July to August (Plate XXIX, fig. 1).



Tundras, meadows and grass plots, cut-over forests (coniferous and birch), coastal regions, rocks.—*European USSR*. Karelia-Lapland, Dvina-Pechora, Volga-Kama (Central Urals); *Western Siberia*; Obsk Guba. *General distribution*: North America (Greenland, Labrador), Scandinavia. Described from Labrador and Greenland. Type in Prague.

*Note*. 1. Strongly variable species the Greenland plant should be taken as the type, a photograph of which is given in Wettstein's work (l.c.) since the name proposed by Pugsley is a simple synonym of the species actually described under the name *E. latifolia* by Wettstein (and not by Pursh, as usually assumed). Comparatively narrow and small-leaved, extremely small-flowered forms of *E. frigida* with more or less, elongated internodes in the inflorescence were often assigned (also by the monographer of the genus, Wettstein) to *E. minima* Jacq., a high-mountains Western European species, which is absent, however, according to the latest ideas, in the flora of northern Europe and apparently is not found in its typical form in the USSR.

2. For Karelia-Lapland (Voroninsk) is reported also *E. bottnica* Kihlm. (*E. macrantha* Brenn. non Rchb.), characteristic of coastal Botnicheskii Bay (Wettstein, l.c. 299), which is close to this species. This report is probably wrong (compare Hulten's "Atlas," where this plant is not shown as growing in the Kola Peninsula).

32. *E. tatrae* Wettst. in Oesterr. bot. Zeitschr. XLIV (1894) 248; Monogr. Gatt. Euphr. 163.—*E. minima* var. *carpathica* Freyn in Sagorski u. Schneider, Fl. Centralkarp. II (1891) 421, non *E. carpathica* Zapal.—*E. officinalis* var. *alpestris* Freyn in Verh. d. zool.-bot. Gesellsch. XXII (1872) 350.—*l.c.*: Wettst. Monogr. Gatt. Euphr. tab. IV, f. 256–261; tab. VIII, f. 9.—*Exs.*: Magnin. Fl. select. exs. No. 2015.

607 Annual. Stem erect, straight, simple, generally thick, covered below with recurved, slightly crispate simple hairs. Lower leaves obovate, cuneate at base, with 1–3 teeth on either side and projecting obtuse-ovate or rounded and truncate tooth above; middle leaves distinctly petiolate, cuneate at base, with 3–5 oblong- or deltoid-lanceolate, sharp-pointed teeth on either side; upper leaves similar, but smaller; all leaves covered along margin and above with scattered, minute, bristles and isolated glands. Calyx eglandular or weakly glandular, with elongated, deltoid-lanceolate, short-pointed teeth. Corolla small, less than 5–6 mm long, with short tube, calyx teeth exceeding corolla throat by end of flowering stage; corolla throat covered in lower part with yellow spots; upper lip bilobed, with reclinate, slightly mix sinuate lobes, whitish or pale violet, with 2–3 stripes on each lobe; lower lip 3-fid with rectangular oblong, sinuate or almost bilobed segments, yellow in middle, otherwise whitish or whitish violet, with 3 violet stripes

on each segment, rarely corolla yellow throughout. Style recurved at tip by end of flowering stage. Capsule oblong, emarginate, slightly or markedly longer than calyx teeth. July to September.

In alpine mountain zone.—*European USSR*: Upper Dniester (Carpathian Mountains). *General distribution*: Central Europe (Carpathians, Ispolinsk Mountains). Described from Tatra Mountains. Type in Vienna.

*Note*. Eastern race of highly polymorphic Central European *E. minima* Jacq. described from Switzerland.

33. *E. grossheimii* Kem.-Nath. in Fl. Gruz. VII (1952) 603.—*lc.*; Kem.-Nat. l.c. fig. 353.

Annual. Plant 4–8 cm tall. Stem simple, dark violet, covered with short, crispate, recurved hairs, uniformly leafy. Leaves almost alternate, light green; cauline leaves obovate or elliptical, with one rounded tooth on either side, rounded at tip, covered on both surface with scattered, short, not very rigid bristles, denser along leaf margin; floral leaves scarcely larger than cauline, almost similar in shape, elliptical or ovate, similarly pubescent, with 2–3 obtuse or subobtuse, non-aristate or short-aristate teeth on either side. Inflorescence interrupted (not condensed), few-flowered; flowers appearing from 3rd node, very small, about 4 mm long, whitish, with pale sky-blue upper lip and yellow spot on lower lip. Calyx subsessile, about 4 mm long, with short bristles on midribs and teeth, otherwise subglabrous, accrescent in fruit, membranous, with short, lanceolate, subacute or subobtuse teeth. Capsule as long as calyx teeth, elliptical, not emarginate or scarcely so, ciliate along margin. July.

In alpine zone.—*Caucasus*: eastern Transcaucasia. Endemic. Described from Mt. Tskhra-Tskharo. Type in Tbilisi.

*Note*. 1. In 1923, we published (in Bot. mat. Gerb. Gl. Bot sada, IV, 8), a separate article on *E. minima* by the authors of the Caucasian Flora, in which they came to the conclusion that *E. minima* Jacq., apparently, is not found in the Caucasus, and that the Caucasian forms treated up to the time as *E. minima* actually belong mainly to *E. petiolaris* Wettst, s. l. Discovery of *E. grossheimii* in the Caucasus has finally helped in finding the species which, it seems to us, is actually related to *E. minima* Jacq. Incidentally, this species is not widely known. We searched for this plant in Mt. Tskhra-Tskharo in 1954, but in vain.

2. The above description of this species was worked out by studying its type, but differs slightly from the author's description. It should be noted that Kemularia-Nathadze assigned to *E. grossheimii*, besides Grossheim's specimens, also some other plants, which it seems to us, do not belong here.

34. *E. drosophylla* Juz. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XVII (1955).—*E. drosocalyx* Syreistsch. and auct. plur. fl. As. Med. in sched. non Freyn.

Annual. Stem erect or partially ascending at base, simple, 2–6 cm tall, reddish, covered with somewhat short, slightly, crispate, recurved hairs, mixed with short-stalked glands in inflorescence. Lower cauline leaves short-elliptical, obtuse, with 1–2 obtuse teeth on either side; upper cauline leaves oblong or ovate, with 3–4 subobtuse or subacute teeth on either side; floral leaves slightly larger than upper cauline, similar in shape or often broadly ovate, with teeth rather acute, but not aristate; all leaves cuneate at base, sessile, green or reddish, covered on both surfaces with generally dense, minute, short-stalked glands mixed with isolated, very short bristles, denser only along teeth margins. Inflorescence very short, subcapitate, ellipsoid, not elongated even by end of flowering stage; flowers subsessile. Calyx rather densely covered along margins and veins with minute, short-stalked glands. Corolla very small, 4–5 mm long, sky-blue, with dark blue stripes and yellowish lower lip. Capsule narrowly oblong, rounded and scarcely emarginate at tip, finely ciliate along upper margin, much longer than calyx when mature. August (Plate XXIX, fig. 2).

611 Alpine grass plots and mixed grass slopes among juniper stands at 2000–2300 m.—*Soviet Central Asia*: Dzh.-Tarbagatai, (Dzhungar Ala-Tau). Endemic. Described from Mt. Koi-Tas in Chulak Region. Type in Leningrad.

*Note.* This species has been referred until now to *E. drosocalyx* Freyn from Europe—Asia Minor (it was thus determined for the first time by D.P. Syreistschikov). However, it differs slightly from it by having truncated teeth in leaves, smaller flowers, and an almost non-emarginate capsule. It is now difficult to say whether it is really closely related to *E. drosocalyx*, or whether the similarity is due to the phenomenon of convergence (the latter seems more probable to us).

35. *E. altaica* Serg. in Tr. Biol. n.-i. inst. Tomsk. Gos. univ. I (1935) 81; Kryn. Fl. Zap. Sib. X, 2481.

Annual. Stem 2–6 cm tall, covered in lower part with recurved, slightly crispate hairs, reddish, with 2nd and 3rd internodes intensely elongated. Cauline leaves in 2–3 pairs, oblong or oblong-ovate, with 1–2 obtuse teeth on either side; bracts larger than leaves, up to 6 mm long, 4 mm broad, similar in shape, cuneate at base, with 2 (rarely 3) short and subacute teeth on either side; all leaves covered with short, simple bristles. Flowers 1–3(5), the first appearing on 2nd or 3rd node. Calyx up to 5 mm long, colored, with lanceolate, aristate teeth and similar pubescence as in leaves and bracts. Corolla 6.5–7(8) mm long, deep sky-blue, when dry



with dark violet veins. Capsule 6–7 mm long, ciliate along margin. July to August.

In alpine zone, on rubbly slopes, in alpine tundra.—*Western Siberia*: Altai Mountains. Endemic. Described from vicinity of Lake Teletsk, Lake Dzhuvlyu-Kul and other places. Type in Tomsk.

*Note.* Reliable specimens of this species were not available to us; our assessment of its characteristics and parentage, is based therefore, solely L.P. Sergievskaja's work.

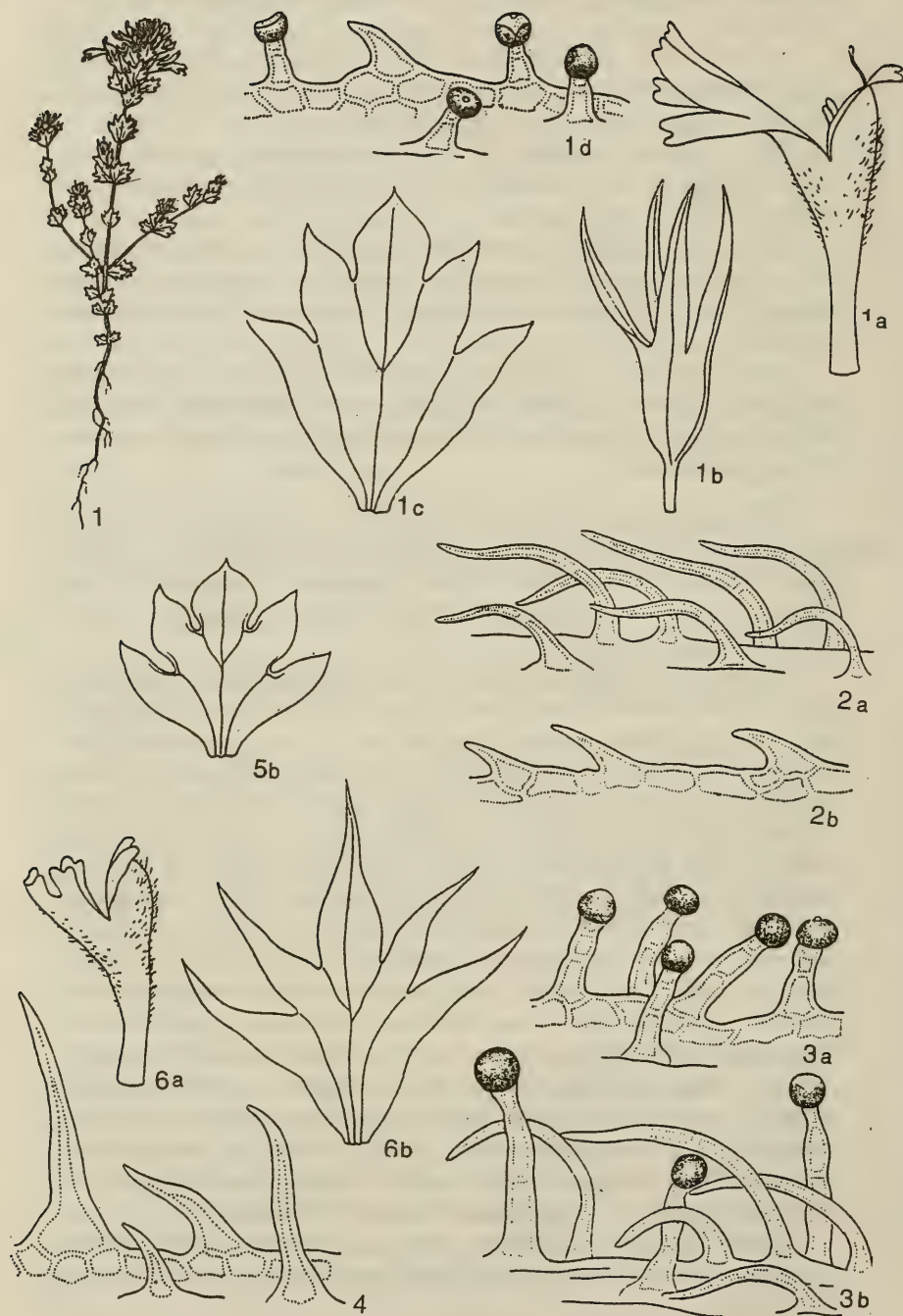
Series 7. *Molles* Juz.—Plants similar to species of preceding series, but with leaves generally covered with dense, fine, somewhat soft, erect bristles. Calyx short, with subacute teeth. Flowers small, yellow. Capsule emarginate.

*Note.* The "type" of this series, *E. mollis* (Ldb.) Wettst., was assigned by Pugsley to series *Latifoliae*. As in the case of *E. micrantha* Rchb., and on the same basis, we preferred to separate it, along with similar species, into another series.

36. *E. mollis* Ldb. ex Benth. in DC. Prodr. X (1846) 553 (nomen in  
612 synonym.); Wettst. Monogr. Gatt. Euphr. (1896) 141.—*E. officinalis* γ. *mollis*  
Ldb. Fl. Ross. III (1847–1849) 263.—*E. officinalis* γ. *alpestris* l. *mollis*  
Herder in Bull. Soc. Nat. Mosc. (1883) 3, 46.—*lc.*: Wettst. l.c. tab. IV,  
f. 205–210; tab. XII, f. 5.

Annual. Stem 2–15 cm tall, erect or partially ascending at base, simple, with few short branches appearing from middle of stem; stem covered with whitish, slightly crispate, recurved, simple hairs, brownish; internodes generally elongated. Cauline leaves few, ovate or subcuneate, obtuse, with few (1–4) obtuse teeth on either side; floral leaves ovate or suborbicular, subobtuse, with 4–6(7) subobtuse or acute, always non-aristate teeth on either side, generally imbricate; all leaves grayish due to dense, comparatively fine, somewhat soft, erect bristles, or such pubescence developing only weakly on upper leaf surface and only along margin and veins beneath. Inflorescence condensed, often subcapitate; flowers few, very small. Calyx about 3 mm, short, with rounded base, pubescent similarly to leaves, with broad, subacute teeth, scarcely accrescent in fruit. Corolla only slightly (up to 1–1.5 mm) longer than calyx, dorsally 3–4 mm long; upper lip bilobed, with horizontally spreading, slightly sinuate lobes; lower lip shorter than upper, 3-lobed, with sinuate lobes, apparently bright yellow, sometimes with lilac upper lip. Capsule elliptical, emarginate, as long as calyx or slightly longer, ciliate along margin, otherwise subglabrous. July to September (Plate XXIX, fig. 4).

*Soviet Far East*: Kamchatka. *General distribution*: North America (Aleutian Islands, Alaska). Described from Unalaska Island. Type in Leningrad.



*Note.* Assigned by Pugsley to series *Latifoliae*, this species, however, belongs (along with the following species) to a separate group with clear North American connections and, in particular, is next to North American *E. disjuncta* Fern. and Wiegand.

37. *E. pseudomollis* Juz. in Bot. Nat. Gerb. Bot. inst. Akad. Nauk SSSR XVII (1955).—*E. mollis* Ishiyama, Ec. pl. S. Sagh. No. 1 (1932) 131; Sugawara, Illustr. Fl. Sagh. VI, 1655, non Wettst.—*lc.*: Sugawara, l.c. tab. 759 (pessima!).

Annual. Stem 14–25 cm tall, erect or partially ascending at base, somewhat flexuous, moderately sometimes profusely branched in upper half, with branches almost reaching height of main stem, brownish, covered with dense, whitish, slightly crispate and generally recurved simple hairs. Cauline leaves oblong-ovate, sessile, broadly cuneate at base, or in uppermost leaves with truncate or rounded base, with about 7 triangular, subobtuse teeth on either side, caducous; floral leaves broadly ovate, with truncate or slightly rounded base, subobtuse, with 5–7 small subobtuse or subacute teeth on either side, imbricate; all leaves densely pubescent on both surfaces with short, fine bristles. Inflorescence short-elliptical or oblong, 1.5–4 cm long, compact, with internodes scarcely elongated; flowers numerous, larger than in *E. mollis*. Calyx about 4 mm long, narrowed at base, similarly but more weakly pubescent than leaves, with subacute, short-aristate teeth. Corolla much longer than calyx, up to 6 mm long, with lower lip exceeding upper. Mature capsule not known. August.

Meadows and other grassy places.—*Soviet Far East*; Sakhalin. Described from Sakhalin ('Traizisku'). Type in Leningrad.

*Note.* *E. pseudomollis* is known to us from extremely limited and inadequate material and its status as a species needs confirmation. We feel that it differs from *E. mollis* in general appearance, form of the calyx and its teeth, larger corolla and elongated lower lip.

Series 8. *Amblyodontae* Juz.—High-altitude Caucasian plant outwardly similar to some species of series *Latifoliae* and *Molles*. Leaves hispid. Inflorescence subcapitate; flowers small, not yellow. Calyx with obtuse or subobtuse teeth. Capsule truncate at tip or slightly emarginate.

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Plate XXX.

1. *Euphrasia petiolaris* Wettst., general appearance of plant, 1a) corolla, 1b) calyx, 1c) floral leaf, 1d) pubescence of floral leaf.—2. *E. alboffii* Chab., 2a) pubescence of stem, 2b) pubescence of floral leaf.—3. *E. adenocaulon* Juz. 3a) pubescence of floral leaf, 3b) pubescence of stem.—4. *E. daghestanica* Juz., pubescence of floral leaf.—5. *E. sevanensis* Juz., 5a) corolla, 5b) floral leaf.—6. *E. taurica* Ganesch. 6a) corolla, 6b) floral leaf.



*Note.* Like the preceding series, this is established by us as a subdivision of the much too heterogenous series *Latifoliae* Pugsl. sensu-lato (see note under *E. amblyodonta* Juz.).

38. *E. amblyodonta* Juz. in Bot. mat. Gerb. Fl. Bot. sada, IV, 8 (1923) 4; Pugsl. in Journ. Bot. LXXIV 287; Grossh. Oprod. rast. Kavk. 317.

Annual. Stem 2–10 cm tall, erect or partially ascending, simple or branched in lower part; branches few, opposite, simple or sometimes branched in turn, slightly flexuous; stem reddish or brownish, pubescent with whitish, recurved, slightly crispate, eglandular hairs. Lower cauline leaves obovate, obtuse, entire or with one obtuse tooth on either side; middle and upper leaves broadly ovate, obtuse, with rounded base, with 1–3 obtuse teeth on either side; floral leaves broadly ovate or suborbicular, obtuse, subcordate at base, with 2–4 obtuse teeth on either side; all 614 leaves green or sometimes reddish, covered along margin or throughout upper surface with scattered, whitish bristles; lower leaf surface often with minute whitish bristles only along veins, leaves sometimes subglabrous. Inflorescence very dense at first, later interrupted at least in lower part; flowers subsessile. Calyx about 3 mm long, with subobtusate or obtuse teeth, uniformly scattered with whitish bristles, accrescent in fruit. Corolla small, dorsally about 5 mm long, with tube not elongated at end of flowering a stage, with bilobed upper lip and 3-lobed lower, with sinuate lobes, whitish, often with pale lilac upper lip, with pale yellow spot on lower lip near throat, with two stripes on either side of upper lip. Capsule ovate or elliptical, truncate of subemarginate, 4–6 mm long when mature, usually exceeding calyx, ciliate along margin, otherwise glabrous. July to August (Plate XXIX, fig. 3).

In alpine mountain zone.—*Caucasus*: Ciscaucasia, eastern Transcaucasia (Central Caucasian range and Mt. Tskhra-Tskharo). Endemic. Described from Mt. Bermamut. Type in Leningrad.

*Note.* Pugsley assigned this species to his 'series' *Latifoliae* Pugsl. We refuse to follow him mainly because very recently the species *E. grossheimii* Kem.-Nath. was described from the Caucasus which hardly differs from European *E. minima* Jacq. and at the same time is very remote from *E. amblyodonta*. Since *E. minima*, apparently, is actually a member of series *Latifoliae* (some Scandinavian forms of *E. frigida* Pugsl. are difficult to distinguish from *E. minima* and were assumed to be same for long time), to assign to this series, besides *E. grossheimii*, yet another extremely dissimilar Caucasian species (found, moreover, side by side with it on Mt. Tskhra-Tskharo would be rather far-fetched. Besides, for *E. amblyodonta*, apparently, quite different affinities are noted (see note under next species).

39. *E. juzepczukii* Denissova in Grossh. Opred. rast. Kavk. (1949) 317 (nomen); in Tr. Bot. inst. Akad. Nauk ArmSSR, VII (1950) 64.—*l.c.*: Denissova, l.c. 64, fig. 4.

Annual. Stem erect, 1–2.5 cm tall, simple or with 1–2 branches appearing almost from base, covered with short, white, crispate, recurved hairs, eglandular. All leaves persistent until flowering stage; cauline leaves obovate, cuneate at base, rounded at tip, with one obtuse teeth on either side; floral leaves similar in shape, but larger, with 1–2 obtuse teeth on either side, often dark violet; all leaves pubescent with very minute, scattered bristles, mainly along teeth margin, upper leaf margin and veins beneath. Inflorescence very short, not longer than 1 cm, condensed, scarcely elongated after flowering; flowers on very short, but distinct pedicels. Calyx covered with scattered, very minute bristles, mainly along veins and on teeth, moderately broadening in fruit, with rather long teeth equaling about 2/5 of calyx length, subobtuse or subacute, usually violet, like upper part of calyx tube. Corolla extremely small, about 3 mm long with tube not elongating, narrowed at limb base, apparently whitish, without distinct stripes. Capsule elliptical, rounded at tip, not emarginate, ciliate along margin, shorter than calyx teeth. August.

In alpine mountain zone, at 3000 m—*Caucasus*: southern Transcaucasia (Mount Aragats). Endemic. Described from Mount Aragats, toward East of Lake Sevlich. Holotype in Leningrad.

*Note.* This little known species, apparently is weakly distinguished from *E. amblyodonta*. On the other hand, it approaches somewhat the Mediterranean *E. willkommii* Freyn, and perhaps is genetically related to it. If this closeness were to be confirmed by further research, *E. willkommii* would have to be removed from series *Latifoliae* Pugsl., where its position, incidentally, is unnatural, as is the position of *E. amblyodonta* (see above) and for the same reason (in Asia Minor, for example, *E. willkommii* and species undoubtedly closely related to *E. minima* Jacq. occur).

Series 9. *Alpinae* Rothm. in Cavanillesia, VII, f. III (1935) 10, emend. Pugsl. in Journ. Bot. LXXIV (1936) 285.—Summer and autumn plant with glabrous or somewhat hispid, eglandular leaves. Corolla very large, with tube later elongated, with broad, elongated lower lip much exceeding upper. Capsule broad, somewhat emarginate.

40. *E. kernerii* Wettst. in Pflanzenfam, IV, 3b (1893) 101; Monogr. Gatt. Euphr. 204.—*E. speciosa* Kern. in Oesterr. Bot. Zeitschr. XXIV (1874) 115, non R. Br.—*E. arguta* Kern. in Sched. Fl. exs. austro-hung. I (1881) 40, non R. Br.—*l.c.*: Wettst. l.c. tab. V. f. 326–336; tab. IX, f. 10.—*Exs.*: Kerner, Fl. exs. austro-hung. No. 146; Schultz, Herb. norm. No. 2053.

Annual. Stem erect or ascending at base, branched (often profusely) almost from base or upper half, with generally elongated branches diverging at acute angle, 8–40 cm tall, reddish or brownish, covered with slightly  
 616 crispate, whitish, recurved hairs, eglandular. Lower cauline leaves broadly cuneate, with few teeth; middle and upper leaves ovate or elliptical, acute, with 4–7 triangular, sharp teeth on either side; floral leaves with 3–6 teeth on either side, teeth slightly incurved, long-acuminate, ending into mucro; all leaves eglandular, slightly asperate due to very minute bristles, especially along margin and veins. Inflorescence condensed at first, later intensely elongated; flowers short-pedicellate or sessile. Calyx eglandular, teeth oblong-lanceolate, mucronate, asperate along margin. Corolla large, 10 mm long at first, reaching 13 mm by end of flowering stage, with tube exceeding calyx teeth, whitish, with yellow spot in throat and at base of lower lip, with dark violet stripes, often with uniformly violet upper lip. Capsule oblong-obovate, emarginate, patently ciliate along margin, otherwise pilulose, reaching only up to half length of calyx teeth. July to August.

Grassy slopes of mountains and hills.—*European USSR*: Upper Dniester. *General distribution*: Central Europe, Mediterranean Region (Italy). Described from Fiume (?). Type in Vienna.

41. *E. picta* Wimm. Fl. v. Schles. III Aufl. (1857) 407; Wettst. Monogr. Gatt. Euphr. 204.—*E. versicolor* Halacsy and Braun, Nachtr. z. Fl. v. Nied.-Oesterr. (1882) 112.—*E. officinalis* b. *picta* Čelakovsky, Prodr. (1881) 831.— *Ic.* : Wettst. l.c. tab. V, f. 337–342; tab. IX, f. 5–7.— *Exs.* : Kern. Fl. exs. austro-hung. No. 917, p.p.; Dörf. Herb. norm. No. 4737.

Annual. Stem erect, simple or with few simple branches diverging at acute angle near middle or lower part, 1–25 cm tall, usually with elongated internodes, green or reddish, covered with short, slightly crispate, recurved hairs. Lower cauline leaves orbicular-cuneate, with 1–2 rounded teeth on either side; middle and upper cauline leaves almost short-petiolate, broadly ovate or orbicular, obtuse, with 3–5 obtuse or acute, but not aristate teeth on either side; floral leaves ovate, subacute or acute, with 3–7 short-pointed non-aristate teeth on either side; all leaves green or sometimes reddish, somewhat thin, slightly asperate due to very short bristles, eglandular. Inflorescence dense at first, later somewhat elongated. Calyx with short bristles along teeth margin and veins, eglandular. Corolla large, 9–11 mm long at initial flowering stage (dorsally measured), finally reaching up to 13 mm,  
 617 with bilobed upper lip and sinuate, replicate lobes, 3-lobed lower lip and sinuate lobes, white, with violet upper lip, very rarely violet throughout, in both cases with violet stripes and with yellow spot on lower lip and in throat. Capsule oblong, obovate, emarginate, ciliate along margin, otherwise glabrous or hispidulous; calyx teeth exceeding capsule. June to August.



Stony mountain slopes, alpine meadows and pastures.—*European USSR*: Upper Dniester. *General distribution*: Central Europe. Described from Silesia. Type in Florence.

Series 10. *Petiolares* Pugsl. in Journ. Bot. LXXIV (1938) 287.—Generally short, well-developed, rarely rather large plants, sparsely or profusely branched. Leaves generally with cuneate base, appearing short-petiolate, as a rule, with few teeth, subglabrous, glandular or hispid. Flowers generally distinctly pedicellate, pedicels short or rather long. Corolla small or medium in size, sometimes rather large, finally with elongated tube. Capsule broad, emarginate.

42. *E. peduncularis* Juz. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XVII (1955).

Annual. Stem erect, 7–22 cm tall, straight or flexuous, simple or with isolated branches appearing from below middle, covered with fine recurved hairs, denser in inflorescence, somewhat reddish. Cauline leaves broadly ovate, short-petiolate, with cuneate or rounded base, obtuse, with 2–3 subobtuse or obtuse teeth on either side; floral leaves broadly ovate, obtuse, with 3–4 short and broad, subacute or short-pointed teeth on either side, often ending into hooked mucro; all leaves sparsely pubescent with somewhat fine bristles, mainly along margin and veins beneath. Inflorescence elongated with distant nodes by end of flowering stage. Pedicels 1–2 mm long, distinct, 3 mm long in fruit. Calyx narrowly obconical, campanulate in fruit, 5–6 mm long, pubescent similarly to leaves, intensely accrescent in fruit, with somewhat short, broadly lanceolate teeth. Corolla medium in size, usually about 7 mm long, with lower lip exceeding upper, apparently whitish. Capsule broadly elliptical or broadly obovate, about 6 mm long, 3.5 mm broad, distinctly emarginate, scattered pilulose, ciliate along margin. July.

In high-altitude and coniferous forest zones.—*Soviet Central Asia*: Dzh.-Tarbagatai, Tien Shan. Endemic. Described from Trans-Alai Ala-Tau, Talgar River. Type in Leningrad.

618 *Note*. It was not possible for us to study authentic material of *E. subpetiolaris* Pugsl., described from the Himalayas and Chinese Turkestan. Judging from the description, it is close to *E. peduncularis*, but not identical. The latter, in any case, is related to the Western Himalayan plant from Khur-Malik, which Pugsley assumes as type material for *E. subpetiolaris*. The plant from Chinese Turkestan (Tien Shan, Upper Kok-Su) is more likely to be identical to *E. peduncularis*.

In our opinion, the relationship of this, as well as the next species, to series *Petiolares* Pugsl. is far from undisputable; it is based on the closeness of these species to *E. subpetiolaris*, assigned to series *Petiolares* by the author of the latter himself. We accepted his viewpoint, chiefly because

we consider the possibility of producing actual Caucasian *Petiolares* from Himalayan Central Asian species as an interesting working hypothesis.

43. *E. schugnanica* Juz. in Bot. mat. Gerb. inst. Akad. Nauk SSSR, XVII (1955).

Annual. Stem erect, straight, rather stout, or often well-developed, 3–35 cm tall, sometimes simple, but usually moderately branched at base; branches few or numerous, somewhat short or intensely elongated, diverging at extreme acute angle, often reaching  $\frac{3}{4}$  of stem length; stem somewhat reddish, sparsely covered with fine, slightly crispate, recurved, whitish hairs. Lower cauline leaves ovate, with cuneate base, obtuse, with 2–4 subobtuse teeth on either side; floral leaves similar to cauline, but larger, with 3–5 acute, but not aristate teeth or (in uppermost leaves) very short-aristate teeth on either side; all leaves covered along margin, on upper surface and along veins beneath with short, scattered bristles, eglandular. Inflorescence generally somewhat intensely elongated, many-flowered; flowers distinctly pedicellate; pedicels much elongated (about 3 mm long) by end of flowering stage. Calyx obconical, with broad and long, very sharp teeth, nearly equaling tube, covered with scattered, somewhat short, simple hairs, eglandular, markedly accrescent in fruit. Corolla small, usually 6–7 mm long, whitish, with pale lilac or bluish upper lip and with narrowly lobed lower lip, slightly exceeding upper, very sparsely pubescent outside. Capsule oblong-obovate, scarcely emarginate, shorter than calyx teeth, sparsely puberulent, ciliolate, along margin. July to August.

Meadows and grass plots along banks of rivers and rivulets.—*Soviet Central Asia*: Pamiro-Alai (Shugnan, Pamir). Described from Shugnan, village of Gardzhun, between Vir and Sardyn. Type in Leningrad.

619 *Note.* This species, placed by us next to the Tien Shan species *E. peduncularis* Juz., is undoubtedly closely related also to *E. fedtschenkoana* Wettst., we assume, as a result of hybridization (see note under *E. fedtschenkoana*).

44. *E. alboffii* Chab. in Bull. Herb. Boiss. 2 sér. vol. II (1902) 517; Grossh. Opređ. rast. Kavk. 317.—*E. minima* Alb. in sched. non Schleich.

Annual. Stem erect or ascending, 6–12 cm tall, well-developed, simple or branched usually in lower half, sometimes profusely branched with short or rarely elongated branches, diverging at acute angle and usually flexuous; stem reddish or brownish violet, sparsely covered with whitish, short, recurved hairs. Lower cauline leaves obovate, with cuneate base, obtuse, with one obtuse tooth on either side; middle and upper leaves similar in shape, but larger and broader, with 1–2 subobtuse or subacute teeth on either side; floral leaves broadly elliptical or suborbicular, acute, with 2–4 acute, but not aristate teeth on either side; leaves all green or

partly reddish, glabrous or hispidulous along teeth margin. Inflorescence condensed at first, later rather intensely elongated and interrupted. Pedicels distinct, later elongated. Calyx with scattered minute glands, usually somewhat hispid along margin and veins, often violet in color, rather intensely accrescent in fruit, with long, narrow and sharp teeth, equaling or even exceeding tube, longer in upper flowers in inflorescence, compared with lower. Corolla large, 6–8 mm long at initial flowering stage, 10–12 mm at the end, with elongated tube, with whitish violet stripes; lower lip large, much longer than upper. Capsule oblong-obovate, subobtusate or weakly emarginate, puberulent or subglabrous, long-ciliate along margin, much shorter than calyx teeth. August to September (Plate XXX, fig. 2).

Alpine meadows and pastures.—*Caucasus*: western Transcaucasia (mainly in Abkhazia). Endemic. Described from "Mountains of Circassia." Type in Geneva.

*Note.* One of the most curious Caucasian forms of series *Petiolares*, seemingly a miniature form of the Central Asian *E. schugnanica*, but at the same time with flowers larger than in the latter.

45. *E. macrodonta* Juz. in Spisok rast. Gerb. fl. SSSR, XI (1949) 152.

620 Annual. Stem erect, 4.5–13 cm tall, comparatively stout, sometimes simple, but usually profusely branched almost from base, with straight or flexuous, rather stout, elongated branches, often as long as main stem, diverging at acute angle or somewhat spreading; stem almost dark violet, covered with somewhat short, slightly crispate, recurved hairs, often with mixture of isolated or scattered short-stalked glands in upper part. Lower cauline leaves cuneate-obovate, obtuse, with one obtuse tooth on either side; middle and upper cauline leaves acute, narrowly obovate or broadly lanceolate, very sharp, with 2 large, elongated and very sharp, but not aristate, generally curved teeth on either side; floral leaves similar to upper cauline, but larger and broader, subrhombic, with 2–3 aristate, variably curved teeth on either side; all leaves green or often reddish lilac in parts, cuneate at base, flat, glabrous throughout or scattered with very minute subsessile glands above and along veins beneath, usually slightly recurved along teeth margin. Inflorescences (in branched samples) numerous, condensed, short and obconical at first, later somewhat elongated, but not interrupted; flowering distinctly pedicellate. Calyx glabrous or scattered with very minute, short-stalked glands, narrowly obconical, scarcely accrescent in fruit, with long and narrow, very sharp, often curved and sinuous teeth. Corolla (compared with plant height) large, 6–9 mm long, with tube elongated by end of flowering stage, whitish or pale violet, with darker upper lip and with few dark violet stripes; lower lip very large, much exceeding upper lip. Capsule narrowly cuneate-ovate, narrowed above, rounded at tip and emarginate, ciliate at tip, otherwise glabrous, much shorter than calyx teeth (reaching about half their length). June to September.



Subalpine meadows, spring-fed marshes, fissures in rocks.—*Caucasus*: Ciscaucasia (western part). Endemic. Described from watershed of Belaya and Laba rivers, Vsebaisk Station. Type in Leningrad.

*Note*. Possibly only a local form of the preceding species though quite well distinguished from it by the character of the dentation of the bracted leaves.

46. *E. kemulariae* Juz. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XVII (1955).

621 Annual. Stem 3–11 cm tall, erect or partially ascending at base, well-developed, branched almost from base or often profusely branched; branches simple or branched in turn, elongated, often exceeding main stem, very well-developed, arcuate or flexuous; stem reddish to dark violet, covered with whitish, replicate hairs. Leaves short-petiolate or subsessile, lowermost cauline leaves cuneate-obovate, rounded at tip, with 1–2 very obtuse teeth on either side; middle and upper leaves broader, obovate to broadly obovate, cuneate at base, obtuse or short-pointed, with 2 obtuse or subobtuse teeth on either side; floral leaves longer than cauline leaves, subrhombic, subacute, with 2, very rarely 3 subobtuse or subacute, but not aristate teeth on either side; all leaves bright green, eglandular, subglabrous on both surfaces, but densely covered along margin with minute, whitish, curved bristles. Inflorescence elongated, rather lax, interrupted at base, 3–6.5 cm long in fruit; flowers distinctly pedicellate. Calyx 3–4 mm long, with long narrowly linear, very sharp teeth, covered similarly to midribs with minute bristles, otherwise subglabrous, almost non-acrescent in fruit. Corolla small, dorsally about 4–5 mm long, with tube elongated or scarcely so by end of flowering stage, with bilobed upper lip and 3-lobed lower lip and narrow sinuate lobes, apparently whitish with violet stripes (yellowish when dry), pubescent outside. Capsule narrowly obovate, cuneate at base, slightly emarginate, long-ciliate along margin, otherwise subglabrous, much shorter than calyx teeth. August.

In alpine zone.—*Caucasus*: western Transcaucasia (Imeretia). Described from Nakerala Range, township of Tskhra-Dzhvari. Endemic. Type in Tbilisi; isotype in Leningrad.

*Note*. Species undoubtedly close to *E. alboffii*, but sharply differing from it by small leaves.

47. *E. petiolaris* Wettst. Monogr. Gatt. Euphr. (1896) 199; Grossh. Opred. rast. Kavk. 317.—*E. coronata* W. Bckr. in Fedde, Repert. XVII, 1–3 (1921) 426.—? *E. officinalis*  $\delta$ . *minima* Ldb. Fl. Ross. III (1847–1849) 263.—*lc.*: Wettst. l.c. tab. IV, 321–325.

Annual. Stem short, 3–15 cm tall, erect or partially ascending, slender, with few or rather numerous, erect or ascending (arcuate) branches

in lower part, very rarely simple, reddish or almost black, covered with slightly crispate, whitish, simple hairs, sometimes mixed with few short glandular hairs (especially in upper part of plant under nodes). Cauline leaves usually small, cuneate-obovate, petiolelike narrowed toward base, obtuse, with 1–3 obtuse teeth on either side; floral leaves similar to cauline, generally larger, with 2–4 obtuse or acute, but not aristate teeth on either side; all leaves somewhat densely covered with minute glandular hairs. Inflorescence short at first, later elongated, but always dense; flowers on short, but distinct pedicels. Calyx pubescent similarly to leaves, with acute teeth, scarcely accrescent in fruit. Corolla dorsally 6–10 mm long, with tube elongated toward end of flowering stage, exceeding calyx; upper lip bilobed, with obtuse, entire or crenulate lobes, lower lip 3-lobed, with sinuate lobes; corolla whitish with pale violet upper lip. Capsule almost equalling calyx, elliptical, slightly emarginate, ciliate along margin, otherwise subglabrous. July to September (Plate XXX, fig. 1).

Rocky places, meadows, grass plots in alpine and subalpine zones.—*Caucasus*: Ciscaucasia, eastern and western Transcaucasia. *General distribution*: Armenia-Kurdistan; reported also for Iran and Himalayas (?). Described from Lazistan. Type in Vienna. Isotype in Geneva.

*Note*. There is no doubt that Wettstein, while describing *E. petiolaris*, confused various forms under this name, differing markedly from one another even by such features as size of flowers (to which Wettstein himself attached great importance and even based the subdivision of his subsection *Semicarcaratae* into the two large groups §1. *Parviflorae* and §2. *Grandiflorae* on it. This is corroborated as indicated by the variation in the measurements of the flowers of *E. petiolaris* made by Wettstein (l.c. 200) himself, as well as by the specimens of this species cited by him, many of which we were able to study. It seems to us that the composite species "*E. petiolaris*," basically corresponding with series *Petiolares* Pugsl. (s. str.), includes large-flowered as well as small-flowered forms elementary species a fact which once more confirms the opinion already expressed in the literature that the taxonomic significance of this feature was exaggerated by Wettstein, and that the subdivision of the subsection into the two said groups is entirely unnatural. As shown by observations, the large-flowered *Petiolares* are distributed mainly in the western parts, and the small-flowered form in the eastern parts of the Caucasian isthmus. The question arises, of course, as to which one of them is the "type" of *E. petiolaris* Wettst. It seems most correct to take the large-flowered *E. petiolaris* as such, since, firstly, Wettstein assigned his *E. petiolaris* to group *Grandiflorae* and, secondly, Wettstein apparently, knew only one of the large-flowered forms of this type, which is quite widely distributed.

623 The assignment of the name *E. petiolaris* to his form, therefore, is quite appropriate. Thirdly, Wettstein gave first place in the list of specimens of

this large-flowered form (from Lazistan); one of these should be selected as the type of *E. petiolaris* Wettst; the best of all is Balansa's specimen from Djimil, the diagram in Plate IV, 321–325.

A photograph of Szovits' specimen from "Russkaya Armeniya. g. Kins", (Armenia Rossica, m. kins), is given by Wettstein in his monograph in Plate XI, fig. 8, but the actual specimen which is referred to one of the small-flowered forms (*E. sevanensis* Juz.) is cited third by him in the list "specimina examinata"! It should, in our opinion, be rejected for the stated reasons as possible "type" of *E. petiolaris*. From a formal point of view, such a rejection is quite proper, since even Wettstein does not present this specimen as the type of his species, and, nowhere has he called it the "original specimen" as he had done in the case of the "type" of many other species.

We did not see the type of *E. coronata* W. Bckr. from mount Karchkhala in Lazistan east of Batumi, collected by W. Rickmer-Rickmers, but do not perceive in the author's description of this species any significant differences from *E. petiolaris* Wettst. s. str.

48. *E. adenocaulon* Juz. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XVII (1955).

Annual. Stem erect, 4–15 cm tall, slender or somewhat thick, very often simple, but usually with few or rather numerous (up to 5), erect, elongated branches, almost dark violet, covered with somewhat short, crispate, white hairs mixed with stalked glands from very base; stalks bicellular, but not well-developed; glands more dense in upper part of stem and in inflorescence. Cauline leaves small, cuneate-obovate, narrowed at base, with 1–2 obtuse teeth on either side; floral leaves larger, broadly ovate or orbicular, sometimes even broader than long, with 2–3 large, obtuse teeth on either side; all leaves often reddish, rather densely covered on both surfaces with short-stalked glands, mixed with very short bristles, especially dense along teeth margin. Inflorescence finally intensely elongated in lower part, interrupted, dense above; flowers short-pedicellate or subsessile. Calyx with pubescence similar to that of floral leaves, scarcely accrescent, teeth acute. Corolla, 7–9 mm long, whitish, with dark violet stripes; lobes of lower lip subequal. Capsule elliptical, rounded at tip, long-ciliate along margin, otherwise scattered puberulent or subglabrous, as long as calyx teeth or shorter. August (Plate XXX, fig. 3).

624 Stony slopes and scrub in subalpine zone of mountains.—*Caucasus*: eastern Transcaucasia. Endemic. Described from southern Ossetia, near village of Edisi. Type in Leningrad.

*Note.* For a long time we considered this species, discovered by us in 1923, as a local hybrid (*E. petiolaris* Wettst.  $\times$  *E. hirtella* Jord. s.l.), as comparatively less important in taxonomic significance. We had to change



this viewpoint after discovering in the Herbarium of the Botanical Institute of the Akad. Nauk GruzSSR a specimen of *E. adenocaulon* Juz. from Upper Svanetia (village of Chibiani, community of Ushkul, collected by A.B. Shelkovnikov in 1911).

49. *E. ossica* Juz. in Spisok rast. Gerb. fl. SSSR, XI (1949) 152.—*E. lebardensis* Kem.-Nath. in Fl. Gruz. VII (1952) 613.—*Id.*: Kem-Nat. l.c. fig. 356 (sub nom. *E. lebardensis*).

Annual. Stem erect, 2–10 cm tall, rather slender, simple or often branched in lower half (sometimes from base), with branches diverging at acute angle or spreading, green or often reddish or dark (almost blackish) violet, covered with short, slightly crispate, generally recurved hairs mixed with few, very minute short-stalked or sessile glands in upper part of stem. Cauline leaves small, cuneate-obovate, obtuse, with 1–2 obtuse teeth on either side; floral leaves larger and broader than cauline, often suborbicular, with 2–4 (usually 3) obtuse teeth, often with almost rounded tip on either side; all leaves green or often partly reddish, broadly cuneate at base, sessile, flat or scarcely striate-rugose, covered with scattered, very minute short-stalked glands, often mixed with very short bristles (especially along teeth margin). Inflorescence condensed at first, later moderately elongated; flowers somewhat distinctly pedicellate. Calyx hispidulous, covered with short-stalked glands, scarcely accrescent, with acute teeth. Corolla small, 4–5 mm long, tube not elongated by end of flowering stage, whitish, with dark blue stripes. Capsule elliptical, orbicular, almost non-emarginate, long-ciliate along margin, otherwise glabrous, shorter than calyx teeth. July to August.

In alpine meadows and pastures, along stony slopes in alpine zone of mountains.—*Caucasus*: Ciscaucasia, eastern Transcaucasia, Dagestan. Endemic. Described from southern Ossetia. Type in Leningrad.

*Note.* In southern Ossetia from where we described it, this species was found along with more or less typical *E. petiolaris* Wettst. However, we never found both of them growing together here.

625 50. *E. sevanensis* Juz. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XVII (1955).—*E. petiolaris* Wettst. Monogr. Gatt. Euphr. (1896) 199, p.p. (quoad pl. Szovitsii em. Kins Armeniae Rossicae).

Annual. Stem erect, 2–8 cm tall, slender or sometimes rather stout, simple or branched in lower half, generally with few branches diverging at very acute angle, generally dark violet, covered with short, white, crispate, recurved hairs, mixed with isolated or scattered short-stalked glands on inflorescence and under it. Lower cauline leaves obovate, cuneate at base, obtuse, with 1–2 obtuse teeth on either side; upper cauline leaves suborbicular, with rounded or very broad and short-cuneate base, obtuse, with

2–3 obtuse teeth on either side; floral leaves similar to upper cauline, but more distinctly broadly cuneate at base and with up to 4 teeth on either side; all leaves dark green, flat, or scarcely striate-rugose beneath, usually distinctly recurved along margin when dry, covered on both surfaces with scattered, dense, short-stalked glands, generally profusely mixed with somewhat short bristles along leaf margin. Inflorescence extremely condensed, often capitate at first, later comparatively moderately elongated, oblong-ellipsoid, not interrupted, floral leaves thus remaining imbricate; flowers short-pedicellate. Calyx covered with short-stalked glands, mixed with bristles mainly along teeth margin, scarcely accrescent, with subacute teeth shorter than tube. Corolla small, 4–6 mm long, with tube later elongated or scarcely so by end of flowering stage, whitish with pale lilac upper lip and dark violet stripes. Capsule oblong-elliptical, rounded or scarcely emarginate above, with long, fine ciliae along margin, longer than calyx teeth when mature. August (Plate XXX, fig. 5).

Grassy slopes mountains zone in alpine. *Caucasus*: eastern and southern Transcaucasia. Described from southern slopes of Shakhdag Range. Gyunaika River. Type in Leningrad.

*Note.* It is not clear how Wettstein could confuse this small-flowered species with *E. petiolaris*, which he assigned to his group *Grandiflorae* Wettst., and even illustrated in his monograph as *E. petiolaris*. By their general appearance, small specimens of *E. sevanensis* can, on superficial study, be mistaken for a species as distant from *E. petiolaris* Wettst. as *E. amblyodonta*. Juz.

51. *E. daghestanica* Juz. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XVII (1955).

626 Annual. Stem erect, 2–9 cm tall, simple or usually branched in lower half with branches diverging at acute angle or almost patent, usually dark violet, covered with short, whitish, recurved, generally crispate hairs, eglandular. Cauline leaves obovate, cuneate at base, obtuse or rounded above, with 1–2 obtuse teeth on either side; floral leaves larger and broader than cauline, broadly obovate to suborbicular, with obtuse, sometimes subacute teeth; all leaves dark green, pubescent with short bristles on upper surface near margin and mainly along veins beneath, but especially densely along leaf margin and teeth. Inflorescence short, condensed at first, later markedly elongated, but with less distant lower flowers; flowers distinctly pedicellate. Calyx covered with scattered short bristles, mixed with few, very minute short-stalked glands, somewhat broadened in fruit, with long, rather acute teeth nearly equaling tube, usually not colored. Corolla small, 4–6 mm long, with almost non-elongated cylindrical tube and small lower lip scarcely exceeding upper, whitish, with dark violet stripes and yellow spot on lower lip. Capsule elliptical, obtuse, scarcely emarginate, diffusely

pilose in upper part, long-ciliate along margin, nearly equaling calyx. July to August (Plate XXX, fig. 4).

Alpine pastures, calcareous rocks in alpine zone, rhododendron undergrowth.—*Caucasus*: Dagestan. Described from Samur Region, near village of Kurush (from Alekseenko's collections). Type and paratypes in Leningrad.

*Note*. A curious plant, in most of its characteristics very similar to races the of the type *E. petiolaris* s. l. (*E. ossica* Juz., *E. sevanensis* Juz.I, but with the pubescence of *E. amblyodonta*. It suggests a hybrid origin.

52. *E. woronowii* Juz. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XVII (1955).

Annual. Stem 5.5–11 cm tall, slender, erect or somewhat ascending at base, straight, simple or with one branch below middle, brownish violet, pubescent with hitish, recurved, short hairs. Cauline leaves shedding by fruiting stage. Inflorescence lax; floral leaves, like flowers, somewhat spaced (lower leaves more distant), broadly ovate, petiolelike narrowed at  
627 base, with 2–4 acute and short-aristate teeth on either side, small, up to 5 mm long and broad, with somewhat dense, minute bristles along margin and with similar, but scattered bristles on upper surface, subglabrous beneath. Flowers somewhat large, as compared with small plant size. Calyx hispid especially along veins and teeth, scarcely inflated in fruit, teeth acute with short-aristate cusp, equaling about 1/3 calyx length. Corolla up to 7 mm long, whitish, with violet stripes and yellow spot in throat. Capsule equaling calyx teeth; obtuse, ciliate along margin, on short, but distinct pedicel. August.

In alpine zone (boulders at 2400 m).—*Caucasus*: Eastern Transcaucasia (in southern Ossetia). Endemic. Described from Khodze-Khor rocks. Type in Tbilisi.

*Note*. At first glimpse, the plant gives the impression of being a stunted form of *E. tatarica*, but more careful study reveals some features characteristic of species of series *petiolares*. It very likely is of hybrid origin. It is abundant, however, even in absence of possible "parents."

53. *E. taurica* Ganesch. apud Poplawska, Spisok rast. sobr. v. Krymsk. Gos. zapov. (1931)87; Juzepczuk in Spisok rast. Gerb. fl. SSSR, XI, 151.—*E. willkommii* Wettst. Monogr. Gatt. Euphr. (1896) 163, p.p. and auct. fl. Taur. non Freyn.—*Exs.*: Gerb. fl. SSSR, No. 3475.

Annual. Stem 2–8 cm tall, erect or ascending in lower part or almost from base, generally branched, sometimes profusely; branches simple or sometimes branched in turn, slightly flexuous; stem reddish or brownish, covered with minute, whitish, replicate hairs and short-stalked glands. Leaves sessile; lower cauline broadly obovate; middle subelliptical, obtuse,



narrowed at base, with two obtuse teeth on either side; upper leaves rhombic, acute, with two teeth on either side, of which lower teeth long tapering, upper shorter and broader, subacute; floral leaves crowded, broadly rhombic, acute, cuneate at base, with 2 large, elongated, erecto-patent, slightly curved or almost flexuous, very sharp teeth on either side; all leaves dark green or reddish, covered on both surfaces with scattered or rather dense, very minute short-stalked glands and whitish 1–3-cellular curved bristles. Inflorescence short, or on main stem rather elongated, very dense or on main stem slightly interrupted in lower part; flowers on short or very short pedicels. Calyx about 6 mm long, with elongated acute teeth, 628 uniformly densely covered with short-stalked glands mixed with minute bristles, accrescent in fruit. Corolla small, dorsally about 5 mm long, with tube not elongated by end of flowering stage, with bilobed upper lip and 3-lobed lower lip, with sinuate lobes, whitish, pubescent outside. Capsule narrowly obovate or elliptical, truncate at tip, short-pointed, slightly narrowed at base, about 5 mm long when mature, shorter than calyx teeth, ciliate along margin, otherwise subglabrous. July to August (Plate XXX, fig. 6).

Rocky, stony and grassy places in Yailas (mountain pastures).—*European USSR*: Crimea. Endemic. Described from Chatyrdag. Type in Lenin-grad.

*Note.* Although Wettstein took this remarkable plant for *E. willkommii* Freyn, it apparently is closer to quite another taxonomic group, namely, series *Petiolares* Pugsl. Pugsley assigned *E. willkommii* to series *Latifoliae* Pugsl. (incidentally, it is clearly an artificial group, in his opinion). From other representatives of series *Petiolares* (and, in particular, its glandular forms), *E. taurica*, is distinguished by sessile flowers.

Series II. *Hirtellae* Pugsl. in Journ. Linn. Soc. Bot. XLVIII (1930) 521.—Plant of variable habit. Leaves covered with multicellular, glandular hairs. Corolla of variable size, from small to very large, with elongated lower lip much longer than upper. Capsule broad, somewhat emarginate.

*Note.* One of the most natural series of those comprising the subsection. Strangely, this fact escaped Wettstein when he established two such species as *E. rostkoviana* and *E. hirtella*, taxonomically far from each other on the basis of differences in flower size. Only after the discovery of such species as *E. fennica*, connecting these types, did their close relationship became clear.

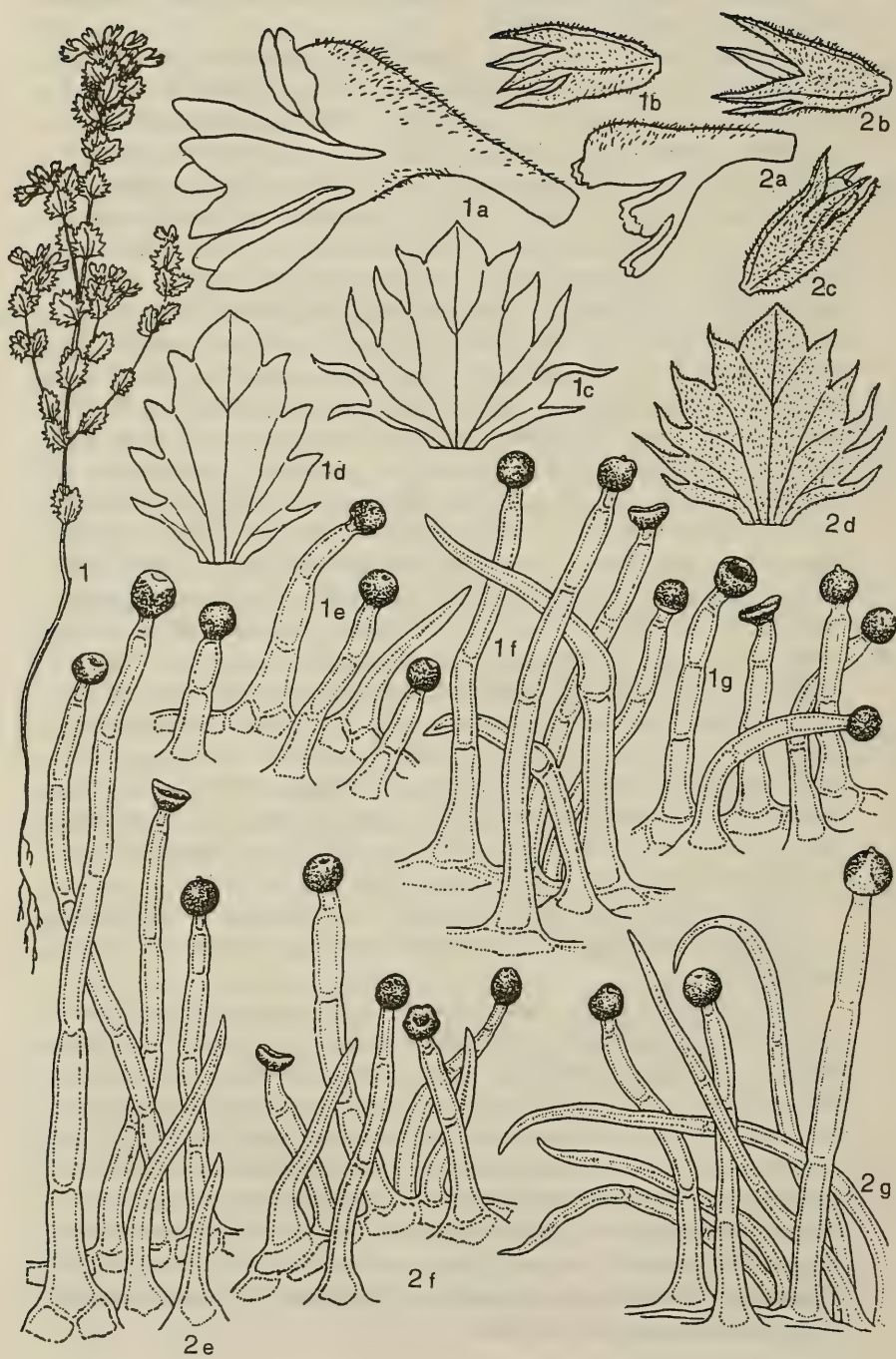
54. *E. amurensis* Freyn in Oesterr. Bot. Zeitechr. LII (1902) 404.—*E. hirtella* var. *ramosa* Freyn in Oesterr. Bot. Zeitschr. LI (1901) 73.—*E. amurensis* × *hirtella* (= *E. ramosa*) W. Bckr. in Fedde, Repert. XVII (1921) 127.—*E. hirtella* var. *karoiana* W. Bckr. l.c.—*E. amurica* Freyn in sched.—*E. manshurica* Plachtij

- 631 in sched.—*E. schlagintweitii* Wettst. Monogr. Gatt. Euphr. (1896) 181. p. min. part. (quoad pl. dahuricum).

Annual. Stem 12–40 cm tall, erect, straight, sometimes simple, more often, however, branched from middle or upper 2/3, or profusely branched, with elongated, almost erect or spreading branches, green, reddish or brownish, densely covered with crispate, patent multicellular, glandular and recurved simple hairs; stem and branches almost villous in upper part. Cauline leaves opposite, lower sessile, oblong-elliptical, cuneate at base, obtuse, with 3–4 obtuse teeth on either side; numerous upper cauline leaves cuneate-ovate, often subpetiolate, subobtuse or acute, with 4–6 teeth on either side, of which lower 1–2 narrowly triangular, acute, others oblique-ovate, subobtuse or subacute; leaves on branches similar to cauline, but smaller, with 4–5 acute teeth; floral leaves opposite, ovate, broadest in lower 3rd part, rounded or usually broadly cuneate at base, with 5(6) acute teeth on either side, lower (or all) of them subaristate, moderately or profusely glandular on both surfaces, with prominent veins beneath; all leaves dark green, sparsely pubescent above, covered with simple bristles and short-stalked glands, covered beneath with long glandular hairs and almost villous along veins. Inflorescence condensed at first, later interrupted; flowers subsessile. Calyx covered with dense, soft, slightly crispate, glandular hairs, accrescent in fruit, with elongated triangular, short-aristate teeth, erect or slightly deflexed at tips. Corolla 8–12 mm long, white or sometimes with light lilac upper lip, generally with dark violet stripes, in exceptional cases uniformly purple; upper lip bilobed, with recurved, bidentate lobes, sparsely villous outside along back edge; lower lip 3-lobed, lobes again bilobed, subglabrous or sparsely puberulent beneath. Capsule oblong, distinctly emarginate, shorter, as long as or longer than calyx teeth, ciliate along margin, otherwise covered with somewhat long, erect or subpatent hairs. June to August (Plate XXXI, fig. 1).

Birch and other forests, forest meadows, logging areas.—*Soviet Far East*: Zeya-Bureya. Endemic? Described from Blagoveshchensk. Isotype in Leningrad.

- Note.* This Soviet Far Eastern species, which was actually unknown to Wettstein, is apparently closely related first of all to the Western European *E. rostkoviana* Hayne, and is one more example of the disjunction, characteristic of a very large number of elements of the deciduous forests of Eurasia. Moreover, *E. amurensis* can be related also to the Himalayan
- 632 *E. schlagintweitii* Wettst. Incidentally, Wettstein reported the latter for Altai Mountains (from Dumberg's specimen and for Dauriya (obviously from Sosnin's specimen). We do not know what the Altai Plant actually was, since we did not see it (perhaps *E. krassnovii* Juz. ?). The plant from Dauriya, apparently, is related to *E. amurensis*. The report of *E. schlagintweitii* from Central Asia is also doubtful.





55. *E. rostkoviana* Hayne, Arzneigewächse, IX (1823) tab. 7: Wettst. Monogr. Gatt. Euphr. 183.—*E. officinalis* L. Sp. pl. (1753) 664. p.p. and auct. mult. s. str.—*E. pratensis* Fr. Nov. Fl. Suec. (1828) 198.—*E. officinalis*  $\alpha$ . *pratensis* Koch in Röhl. Deutsch. Fl. IV (1833) 346.—*E. officinalis*  $\alpha$ . *grandiflora* Wallr. Sched. crit. (1822) 320—*E. officinalis*  $\alpha$ . *vulgaris* Spenner, Fl. Friburg. I (1825) 362; Benth. in DC. Prodr. X, 552 (sub  $\gamma$ .).—*E. officinalis*  $\alpha$ . *rostkoviana* Rohrer and Meyer, Vorarb. z. einer Fl. d. Mähr. Gouv. (1835) 136.—*lc.*: Hayne, l.c.: Strum. Deutschl. Fl., I Abt. 3 Bdch.; Sowerby in Engl. Bot. Third ed. vol. VI, tab. 991; Wettst. l.c. tab. V. f. 301–313, tab. IX. f. 1.—*Exs.*: Fl. exs. austro-hung. No. 150; Schultz, Herb. norm. nov. ser. No. 1839; Woloszcz. Fl. pol. exs. No. 556a.

Annual. Stem 10–50 cm tall, erect or partially ascending, usually branched in lower part, with opposite, partially ascending branches, branched in turn, very rarely simple, green, reddish or brownish, covered with whitish, recurved, slightly crispate hairs, and with long glandular hairs on nodes in some places and along internodes. Lower leaves cuneate, obtuse, with few obtuse teeth; middle and upper leaves ovate, short-pointed, with 3–6 acute, but not aristate teeth on either side; floral leaves almost opposite, similar to cauline, but shorter and broader, gradually tapering above; uppermost leaves often cuneate at base, with more acute (but not aristate teeth; all leaves green, rarely turning red, plicate-striated beneath, somewhat densely covered with whitish simple bristles (especially floral leaves at base) and long, articulate, multicellular hairs. Inflorescence condensed at first, later elongated, flowers subsessile. Calyx with pubescence similar to that of leaves, always glandular, not accrescent in fruit. Corolla large, dorsally 9–11 mm long at first, 11–14 mm long at end of flowering stage, with elongated tube much exceeding calyx, with bilobed upper lip and sinuate or bilobular, replicate lobes, with 3-lobed lower lip and sinuate lobes, white, with violet upper lip and lower lip with yellow spot and violet stripes, yellow in throat, sometimes violet throughout, rarely both lips white. Capsule elliptical, emarginate, not exceeding or scarcely exceeding calyx teeth, long ciliate along margin, otherwise pilulose. June to October.

Light deciduous forests, forest edges, scrub, meadows and other grassy places.—*European USSR*: Baltic Region, Upper Dnieper, Upper Volga, Middle Dnieper, Volga-Don, Upper Dniester. *General*

#### Plate XXXI.

1. *Euphrasia amurensis* Freyn, general appearance of plant. 1a) corolla, 1b) calyx, 1c) floral leaf, 1d) cauline leaf, 1e) pubescence of floral leaf. 1f) pubescence of stem, 1g) pubescence of calyx.—2. *E. hirtella* Jord.: 2a) corolla, 2b) calyx, 2c) calyx with capsule, 2d) floral leaf, 2e) pubescence of calyx, 2f) pubescence of floral leaf, 2g) pubescence of stem.

*distribution*: Scandinavia. Central and Atlantic Europe, Balkan States-Asia Minor (northern part of Balkan Peninsula). Mediterranean Region (northern Italy). Described from Saxony, Aschersleben. Type in Prague.

*Note*. Real Western European *E. rostkoviana*, a form with exceptionally large flowers and the typical autumn habit, is found only in the western regions of the USSR. According to V.N. Khitrovo, the race growing here is not typical *E. rostkoviana*, but a distinct summer race of this type, which is the original undifferentiated form, from which have evolved both, *E. rostkoviana* s. str. and *E. montana* Jord. and to which he gave the name *E. praerostkoviana* Chitr. V.N. Khitrovo did not note, however, the fact that the forms combined by him under this name have, in most cases, small flowers compared with *E. rostkoviana* and *E. montana*, and possibly, basically belong to a hybrid complex presently, called *E. fennica* Kihlm. (see below).

*Economic importance*: Earlier, this was considered a medicinal plant, and was used in the treatment of ophthalmic diseases. It is now used only in homeopathy (in the form of an essence prepared from a fresh plant in the flowering stage) and also in popular medicine. It contains the glucoside aucubine, tannin, an essential oil and an aromatic resin.

· 56. *E. montana* Jord. in Mém. de l'Ac. Nat. de Lyon, cl. de sc. I (1851) 343 (seorsum impr. 132); Wettst. Monogr. Gatt. Euphr. 194,—*l.c.*: Wettst. l.c. tab. V, f. 314–320, tab. IX, f. 2–4.—*Exs.*: Dörf. Herb. norm. No. 3362; GRF, 1581a.

Annual. Stem simple or rarely with few straight, almost erect branches in upper part, 5–25 cm tall. Lower cauline leaves cuneate or cuneate-ovate, obtuse, with few obtuse teeth; upper leaves ovate, obtuse, with 3–5 obtuse teeth on either side, both distantly spaced; floral leaves subopposite, similar to cauline, but broader, acute, with elongated and pointed teeth. Inflorescence condensed at first, later moderately elongated; first flowers appearing on 2–6(7)th node. Corolla large, 9–11 mm long at first, 11–14 mm long with tube exceeding calyx at end of flowering stage. In other features similar to *E. rostkoviana* Hayne, of which it is early-flowering meadow race. May to June.

634 Meadows.—*European USSR*: Baltic Region, Ladoga-Ilmen? Upper Dnieper, Upper Volga, Volga-Don, Middle Dnieper, Upper Dniester. *General distribution*: Scandinavia, Central and Atlantic Europe. Described from France. Type not known.

*Note*. The distribution range of this species in the USSR is not clear, Since specimens of *E. onegensis* Cajand. are often cited under it. Thus, for example, the specimens issued in the GRF from Pskov District under No. 1581 most likely belong to *E. onegensis* (cf.).

57. *E. fennica* Kihlm. in Meddel. af Soc. pro. F. and Fl. Fenn. 24 (1900) 92; Kryl. Fl. Zap. Sib. X, 2486.—*E. fennica* ssp. *aestivalis* Ganesch. in Maevsk., Fl. ed. 6 (1933) 611.—*E. praerostkoviana* Chitr. in Tr. Bot. muz. III (1907) 27, saltem p. max. p.; Kryl. Fl. Zap. Sib. X, 2487.—*Exs.*: GRF, No. 330, 1674; Pl. Finl. exs. No. 354, 931 and 932 (f. *macrantha*).

Annual. Stem 10–20(40) cm tall, erect, well-developed, simple or often with few slender branches in lower or middle part, covered with crispate whitish hairs mixed with glandular hairs; branches sometimes branched in turn. Leaves sub-opposite, often very distant, upper ovate, with 4–6 acute, identical teeth on either side, green, covered with short bristles and long (especially at leaf base), articulate, glandular hairs; floral leaves broadly ovate or suborbicular, with 5–8-pointed teeth on either side, with pubescence similar to that of cauline leaves. Inflorescence almost always elongated, denser (at flowering stage) only at tip. Calyx non-acrescent, usually slightly longer than mature capsule, with pubescence similar to that of leaves. Corolla (5.5)7–8(9) mm long, with tube scarcely elongated, whitish; lower lip with yellow spot in throat and violet stripes. Capsule ovate or narrowly ovate, emarginate. July to August.

Meadows, glades and other grassy places, scrub, cut-over forests, forest edges, logging areas, wastelands, fallow lands, among crops.—European USSR: Karelia-Lapland, Dvina-Pechora, Volga-Kama, Ladoga-Ilmen, Upper Dnieper, Upper Volga, Middle Dnieper, Volga-Don. General distribution: Scandinavia. Described from Finland. Type in Helsinki.

*Note.* A polymorphic species, which is a complex of fairly heterogeneous forms intermediate between *E. rostkoviana* Hayne and *E. hirtella* Jord. These forms grow in places close to the distribution range of both these species and, apparently, have hybrid significance. They are rather widely distributed and their range markedly exceeds, for sample, the range of *Picea fennica* (Rgl.) Kom., significantly carrying the same epithet as *E. fennica* and, perhaps, having a similar origin.

635 Especially large-flowered specimens of this species (*E. fennica* f. *macrantha*) are indistinguishable from *E. praerostkoviana* Chitr., species described from "Central Russia" (type from the former Bolkhovsk logging in the Orlovsk District, Vytebet River), which, however, was taken by its author as the separate summer race, *E. rostkoviana*, not yet differentiated into *E. rostkoviana* s. str. and *E. montana* (see also note under *E. rostkoviana* Hayne and *E. hirtella* Jord.)

58. *E. onegensis* Cajand. in Veg. Alluv. Onega Thal (1915) 54, nomen; Kryl. Fl. Zap. Sib. X, 2486.—*E. fennica* ssp. *praecox* Ganesch. in Maevsk. Fl. ed. 6 (1933) 611.



Annual. Stem simple or weakly branched, 10–20 cm tall, Cauline leaves oblong, with 2–3 teeth on either side, distantly spaced; floral leaves broadly ovate, with 2–4 acuminate teeth on either side. First flower appearing on 3rd or 4th node. Corolla 7–8(9) mm long. In other characteristics similar to *E. fennica* Kihlm., constituting its early-flowering meadow race. June.

Damp meadows. *European USSR*: Karelia-Lapland, Dvina-Pechora, Volga-Kama, Ladoga-Ilmen, Upper Dnieper, Upper Volga, Volga-Don, Volga-Kama; *Western Siberia*: Ob' Region. *General distribution*: Scandinavia. Described from Prionezhye. Type in Helsinki.

*Note*. A comparatively early-flowering wetland differentiated meadow race of preceding species.

59. *E. hirtella* Jord. in Reuter in Compt. rend. d. l. soc. Haller. IV (1854–1856) 120; Wettst. Monogr. Gatt. Euphr. 175;—Kryl. Fl. Zap. Sib. X, 2434; Grossh. Opred. rast. Kavk. 317.—*E. nemorosa*  $\beta$ . *pectinata* Rchb. Fl. Germ. exc. (1830–1832) 358.—*E. officinalis*  $\alpha$ . *imbricata* Benth. in DC. Prodr. X (1846) 552.—*E. tatarica* Ldb. Fl. alt. II (1830) 423, non Fischer.—*E. officinalis*  $\alpha$ . *latifolia* Ldb. Fl. Ross. III (1847–1849) 263, p.p.—*E. officinalis*  $\gamma$ . *tatarica* Boiss. Fl. or. IV (1879) 462, p.p.—*E. officinalis*  $\delta$ . *hirtella* Kryl. Fl. alt. IV (1904) 956.—*E. polyadena* Gr. and Roux, sec. Camus Cat. d. pl. d. Fr. (1888) 214.—*E. brandisii* Freyn in Verh. zool.-bot. Gesellsch. XXXVIII, (1888) 623.—*E. krylovii* Serg. in Tr. Biol. n.-i. inst. Tomsk. Gos. univ. I (1935) 90; Kryl. Fl. Zap. Sib. X, 2485.—*E. hirtella* ssp. *aestivalis* Ganesch. in Maevsk. Fl. ed. 6 (1933) 611.—*E. lepida* Stank. Opred. (1949) 812, non Chab.—*Ic.*: Ldb. Ic. Fl. Ross. V, tab. 435; Wettst. l.c. tab. IV, f. 278–290; tab. VIII, f. 4–7.—*Exs.*: Schultz, Herb. norm. nov. ser. No. 1188 p.p. and No. 2570 (nom. *E. brandisii*).

Annual. Stem 3–40 cm tall, erect, straight, usually well-developed, rarely rather stout, simple or rarely branched in upper half with branches diverging at acute angle, pale or variably turning red or lilac, later usually brownish, covered with somewhat long patent, crispaté, multicellular, simple and glandular hairs mixed with few unicellular, somewhat short, simple hairs. Lower leaves cuneate-ovate, obtuse, with few obtuse teeth; upper cauline leaves narrowly or broadly ovate to suborbicular, with rounded or truncate base, subacute, with 3–6 obtuse or subacute teeth on either side; floral leaves ovate or often broadly ovate, up to orbicular or broadly deltoid, acute, with 3–8 acute or acuminate teeth on either side, often imbricate; all leaves covered with generally dense (especially beneath, near base) long multicellular glandular hairs mixed with somewhat long bristles, with very prominent veins beneath, grayish green or rather bright green, usually not turning black when

dry. Inflorescence dense at first, later (after flowering) somewhat (often very) lax and elongated. Calyx 4–5 mm long, with pubescence similar to that of leaves, moderately accrescent, with acute, lanceolate, non-aristate teeth, glandular-pubescent up to tip. Corolla small, 4–6(7) mm long, whitish or generally with pale violet upper lip, with dark violet stripes and with yellow spot on lower lip. Capsule ovate or narrowly ovate, emarginate, ciliate along margin, otherwise pilulose (especially in upper part), equaling or slightly exceeding calyx. June to August (Plate XXXI, fig. 2).

Meadows, grassy steppes, forest glades and other grassy places, scrub, forest edges, deciduous, coniferous and mixed forests.—*European USSR*: Dvina-Pechora, Ladoga-Ilmen (?). Upper Volga, Volga-Kama, Volga-Don: *Caucasus*: all regions except Talysh; *Western Siberia*: Ob' Region, Altai Mountains; *Eastern Siberia*: Yenisey, Angara-Sayan, Dauria: *Soviet Central Asia*: Dzh.-Tarbagatai. *General distribution*: Central and Atlantic Europe, Balkan States-Asia Minor, Dzh.-Kashgar, India-Himalayas, Mongolia. Described from France. Type, probably, in Paris (or in London?).

*Note*. A fairly polymorphic species with a large, discontinuous range; the forms presently combined under this name are in need of careful study; possibly, it will prove to be a composite species. It is related to this species with the summer habit. Occupying the vast expanse of Siberia and the Ural Region in the eastern part of its range, situated in the gap between the areas of *E. amurensis* and *E. rostkoviana*, *E. hirtella* undoubtedly differs from them in more respects than they differ from each other, and could be separated into a separate series, but for its close relation with *E. rostkoviana* through *E. fennica*. The relationship we believe to be of a hybrid character, however, and of recent (post-Glacial) origin.

637 The high-altitude forms of *E. hirtella* are unique. They are specific to the various mountainous countries, connected by a series of stepwise intermediates with the forms of lowland habitats and are, perhaps, simple modifications. Once such form is *E. krylovii* Serg., described by L.P. Sergievskaja, from the Altai Mountains, which is distinguished by low height, well-developed stems, elongated internodes, oblong involucre bracts and a small number of flowers. Analogous forms grow, however, also far beyond the range of the Altai Mountains (for example, in the Caucasus and Western Europe). Not intending to identify them with *E. krylovii* Serg., we shall refrain from even citing here the latter as separate species, leaving final judgement about it to those able to study the collective species *E. hirtella* in every detail.

2. The following species are important hybrid forms, connected in their origin with *E. hirtella* Jord., s. l. (if they are not simple hybrids).

60. *E. sosnowskyi* Kem.-Nath. in Fl. Gruz. VII (1952) 64.—*E. carthalinica* Kem.-Nath. l.c. 603.—*l.c.*: Kem.- Nat. l.c. figs. 352–354.

Annual. Stem 10–20 cm tall, stout, simple or sparsely branched, with stout, thick branches, pale or violet, vegetative internodes markedly spaced. Leaves comparatively large, lower cauline leaves ovate, generally with 2 obtuse teeth on either side; upper leaves broadly ovate to orbicular, with 3–4 subobtuse or subacute, but not aristate teeth on either side, obtuse. Inflorescence reduced, condensed; floral leaves broadly ovate to orbicular, with rounded base and 4–5 subobtuse or subacute non-aristate teeth on either side, dark green like all leaves, plicate-veined beneath, diffusely hispid above, lower surface covered in upper half and along margin with numerous rigid bristles, similarly pubescent in lower half, but mixed with numerous long-stalked glands. Calyx densely hispid along teeth and margin veins with mixture of long-stalked glands, inflated in fruit. Corolla small, 4–6 mm long, whitish. Capsule equaling or slightly exceeding calyx. July to August.

Meadows and other grassy places.—*Caucasus*: eastern Transcaucasia. Endemic. Described from Bakuriani. Type in Tbilisi.

*Note.* This plant, apparently, is hybrid in origin (*E. georgica* Kem.-Nath.  $\times$  *E. hirtella* Jord.). We have included *E. carthalinica* Kem.-Nath. as its synonym, since in our opinion both have a similar origin, although they both have a different combination of characteristics of the parental forms. The above description gives the characteristics of the type material *E. sosnowskyi*. The “type” of *E. carthalinica* is a weaker and less well-  
638 formed, sparsely pubescent plant, with an elongated and lax inflorescence, but in the other characteristics it coincides with *E. sosnowskyi*.

61. *E. bakurianica* Juz. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XVII (1955).—*E. oligadena* Juz. in sched. olim.

Annual. Stem (5)7–12 cm tall, slender, well-developed, slightly flexuous, simple, pale-colored or slightly reddish (especially in upper part) covered below with recurved, crispate, whitish hairs; nodes spaced, flowers appearing on 3rd or 4th node. Cauline leaves ovate or elliptical, short-petiolate or sessile, with 1–4 obtuse or rounded teeth on either side, with large rounded tooth at tip; floral leaves few, broader than cauline leaves, elliptical, broadly elliptical or broadly ovate, with 3–4 obtuse teeth on either side, rounded at tip; all leaves bright green, sparsely pubescent above and along margin with fine bristles, pubescent beneath with comparatively few long-stalked glands along veins and at base. Inflorescence with small number of somewhat spaced internodes, short, somewhat lax; flowers small, corolla 4 mm long, white, with dark violet stripes and with yellow spot at base of lower lip. Calyx in fruit about 4 mm long, sparsely



crisped-hairy, with very few glands; calyx teeth acute, somewhat short, about 1/3 as long as calyx, scarcely inflated in fruit. Mature capsule slightly exerted from calyx teeth, emarginate, long-ciliate along margin. July.

Meadows.—*Caucasus*: eastern Transcaucasia. Endemic. Described from vicinity of Bakuriani (Ktsiya River valley). Type in Tbilisi.

*Note*. This plant undoubtedly is related to the high-altitude Caucasian form, *E. hirtella*, but it is difficult to combine it with the latter owing to its sparsely glandular pubescence and very obtuse, generally rounded teeth. Possibly, it owes its origin to the hybridization of *E. hirtella* Jord. s. l. with *E. grossheimii* Kem-Nath.

Subsection 2. *Angustifoliae* [Wettst. Monogr. Gatt. Euphr. (1896) 69 pro serie] Jörgens. in Bergens Mus. Aarb. (1919) 61.—European species with subglabrous leaves. Floral leaves very often longer than cauline, at least 2 times as long as broad (sometimes much more, up to 30 times), lanceolate to linear, with narrow spaced teeth. Capsule glabrous or weakly ciliate. USSR has only one representative of this group.

62. *E. salisburgensis* Funk in Hoppe, Bot. Taschenbuch f. d. Jahr. 1794, 184 and 190; Wettst. Monogr. Gatt. Euphr. 218.—*E. officinalis* var. *salisburgensis* Schleicher, Cat. Pl. Helv. (1800) 22; Neilreich. Fl. 639 Nied.-Oesterr. 563.—*E. tricuspidata* Allioni, Fl. Pedem. I (1875) 60, non L.—*E. alpina* Baumgarten, Enum. stirp. Transs. II (1816) 195, non Lam.; Zapalowicz, Rosl. szata gor Pokucko Marm. 270.—*E. stricta* Beck. and Szyszyłowicz, Plantae a Dr. J. Szysz. in Crnagora lect. (1888) 136, nec aliorum.—*lc.*: Wettst. in Oesterr. Bot. Zeitschr. XLIII, tab. VI, f. 1–29; Monogr. Gatt. Euphr. tab. III, f. 1–29, tab. X, f. 6–10.—*Exs.*: Schultz, Herb. norm. No. 10; Fl. exs. austro-hung. No. 144, 145; Fl. Stir. exs. No. 886, 1252.

Annual. Stem erect, simple or branched in lower part (often profusely branched), 1–25 cm tall, reddish or violet, covered with somewhat crisped, recurved, whitish hairs; branches elongated, diverging at acute angle or almost erect, often bent or slightly flexuous; lower branches opposite, upper alternate. Lower leaves cuneate, obtuse, with 1–2 teeth on either side, middle and upper leaves lanceolate, broadest in middle, 2–5 times as long as broad, long acute, with 2–3 patent, often upcurved, narrowly triangular or lanceolate, long aristate teeth on either side; floral leaves similar to upper cauline, but broader, broadest below middle, with 2–5 (usually 3) elongated teeth on either side; all leaves green or often turning red, glabrous throughout or covered beneath with scattered sessile glands, or with scattered very minute bristles along margin and veins. Inflorescence rather dense at first, intensely elongated in fruit; flowers short-pedicellate or subsessile. Calyx glabrous throughout or scattered with very minute bristles, scarcely accrescent in fruit. Corolla small, 6–8 mm long at end

of flowering stage; upper lip bilobed, with replicate-sinuate or serrulate lobes; lower lip 3-lobed, with sinuate lobes pilose beneath only at base, whitish, with bluish upper lip, rarely blue, purple or violet throughout. Capsule cuneate-oblong, truncate and emarginate, equaling or exceeding calyx teeth, glabrous throughout or with scattered, short, incurved hairs only at tip along margin. July to September.

Grassy, often shady stony and rocky places, banks of rivulets, forest edges and grass plots, mainly in alpine zone of mountains, usually on limestone.—*European USSR*: Upper Dniester. *General distribution*: Central Europe, Scandinavia (Gotland Island), Mediterranean Region. Described from Salzburg. Type in Vienna, isotypes in Regensburg and Prague.

*Note*. 1. We have not yet seen a specimen of this species from the territory of USSR.

2. The species *E. lapponica* T.E. Fries [in Ark. Bot. Stockh. XVII, 640 No. 6 (1922) 12], closely related to *E. salisburgensis* Funk, grows in Scandinavian Peninsula. The possibility of its occurrence in the Kola Peninsula cannot be ruled out. *E. lapponica* differs from *E. salisburgensis* firstly by having much broader leaves with a comparatively small size.

### Genus 1353.—*OMPHALOTHRIX*<sup>1, 2</sup> Maxim.

Maxim. Prim. Fl. Amur. (1859) 208; Benth. and Hook. Gen. pl. II (1876) 977.

Flowers in spreading paniculate inflorescence. Calyx campanulate-tubular, with 4 ribs, incised almost up to half into two bidentate lobes. Corolla exceeding calyx, with cylindrical tube and bilabiate limb; upper lip galeate with replicate margin, lower lip exceeding upper, 3-lobed. Stamens 4, under upper lip; lower stamens longer; anther chambers tapering into cusp in lower part. Fruit an ovate-oblong capsule, flattened on valvular side, with septum pilulose at place of seed insertion. Seeds pendent, (6–10 in each locule), longitudinally sulcate. Annuals with opposite leaves. Monotypic species.

1. *O. longipes* Maxim. Prim. Fl. Amur. (1859) 209; Kom. Fl. Manchzh. III, 1, 445; Kom. and Alis. Oprod. rast. Dalnevost. kr. II, 922.—*lc.*: Maxim. l.c. tab. X.

Annual. Root short, branched. Stem 10–45 cm tall, erect, slender, branched from middle or in upper part, branches opposite, almost horizontally projecting or ascending, pubescent similarly to stem with simple, white, crispate, generally recurved hairs. Leaves (3.5)4–10(12) mm

<sup>1</sup> Treatment by V.F. Golubkova.

<sup>2</sup> From the Greek *omphalos*—navel, and *thrix*—hair; named for structure of fruit.

long, (0.8)1–2(3) mm broad, oblong-lanceolate, obtuse, asperate along margin, crenate-serrate, with 4–5 short teeth on either side, prominent midrib beneath, glabrous. Flowers numerous, solitary in leaf axils and on stem tips, on 7–12(17) mm long, filiform, spreading, slightly curved pedicels, pubescent similarly to branches. Calyx campanulate-tubular, (3.2)3.8–4(5) mm long, glabrous outside, with 4 prominent ribs passing from base to teeth, and two shorter ribs, sometimes asperate, passing between calyx lobes; calyx teeth thickened, asperate mainly along margin. Corolla white, 4.8–5(5.5) mm long, with cylindrical tube, pubescent inside from middle to limb; limb bilabiate, diffusely appressed-pilose outside  
 641 in upper part; upper lip galeate, shallowly sinuate; lower lip longer than upper, with orbicular, obtuse (sometimes slightly sinuate) lobes, middle lobe slightly longer than lateral lobes. Stamens included; filaments adnate with tube up to half their length, broader and thickened at base; anther lobes rounded above, pointed in lower part, sometimes fimbriate along margin of dehiscence cleft. Style 4 mm long, sparsely pilose in upper half (but not up to stigma); stigma capitate, oblique. Capsule oblong-ovate, obtuse, hairy above. Seeds 1 mm long, 0.4 mm broad, light yellow (almost white), with short longitudinal ribs, densely, finely, transversely ribbed in between. July to August.

In marshy and damp meadows, along banks and raised bottoms of lakes and river beds.—*Soviet Far East: Zeya-Bureya*, Ussuri. *General distribution*: China (Manchuria), Korea, Mongolia (Ordos). Described from Amur, Khingan Post. Type in Leningrad.

### Genus 1354. *PARENTUCELLIA*<sup>1, 2</sup> Viv.

Viv. Fl. Lib. Sp. (1824) 31.—*Eufragia* Gris. Spicil. fl. Rum. and Bith. II (1844) 13; Benth. in DC. Prodr. X, 542.—*Bartsia* sect. 1. *Eufragia* Benth. and Hook. Gen. pl. II (1876) 977.

Flowers in spicate inflorescence on very short pedicels or subsessile, single in upper leaf axils. Calyx narrowly campanulate, with 4 linear-lanceolate teeth. Corolla purple or yellow, exceeding calyx, tube cylindrical, rather long, limb bilabiate, upper lip galeate with undeflexed margin; lower lip longer than upper, bent downward, with 3 entire lobes rounded at tip. Stamens 4, lower two longer than others; anthers pointed in lower part. Style scattered pilulose; stigma thick, bilobed. Capsule flattened, lanceolate. Seeds numerous, horizontally diverging, minute, elliptical, almost smooth (slightly finely tuberculate or longitudinally rugose).

<sup>1</sup> Treatment by V.F. Golubkova.

<sup>2</sup> Named after Thomas Parentucelli, Pope Nicholas V, founder of library in the Vatican and Botanical Garden in Rome.



Annuals, pubescent with simple and glandular hairs. Stems erect, simple or branched. Leaves opposite, sessile, ovate or oblong, dentate along margin.

Of 4 species of this Mediterranean genus, 3 are found in USSR.

1. Leaves oblong-lanceolate, crenate-serrate; corolla 15–25 mm long; capsule pilose in upper part ..... 3. *P. viscosa* (L.) Caruel.
- 642 + Leaves broadly ovate or orbicular-ovate, deeply incise-dentate, with 3–7 (usually 5) teeth; corolla 9–14 mm long; capsule glabrous ..... 2.
2. Corolla purple; stem rather thick, generally reddish ..... 1. *P. latifolia* (L.) Caruel.
- + Corolla yellow; plant better developed; stems slender, yellowish ..... 2. *P. flaviflora* (Boiss.) Nevski.

Series 1. *Latifoliae* Golubk. Plants well-developed. Leaves broad, deeply incise-dentate. Inflorescence reduced; flowers small. Capsule glabrous.

1. *P. latifolia* (L.) Caruel in Parl. Fl. Ital. VI (1885) 480; Grossh. Fl. Kavk. III, 399.—*Euphrasia latifolia* L. Sp. pl. (1753) 604; Schmalh. Fl. II, 286.—*Trixago latifolia* Rchb. Fl. Germ. exc. (1830–1832) 360.—*I. purpurea* Stev. in Mém. Soc. Nat. Mosc. VI (1823) 4.—*Eufragia latifolia* Griseb. Spicil. fl. Rum. and Bith. II (1844) 14; Benth in DC. Prodr. X, 542; Ldb. Fl. Ross. III, 1, 258; Boiss. Fl. or. IV, 473.—*Bartsia latifolia* Sibth. and Sm. Fl. gr. I (1806) 428.—*Ik.*: Rchb. Ic. fl. Germ. XX, tab. 1725, IV.—*Exs.*: Fl. Cauc. exs. No. 74.

Annual. Root short, branched. Stem 7(10)–30 cm tall, erect or partially exceeding, generally reddish, rarely yellowish, simple or sometimes with 2–3 pairs of opposite branches at base, pubescent with short, simple and glandular hairs. Cauline leaves 4–8 pairs, lowermost usually densely crowded, with shallower, broader, more obtuse teeth; upper 2–3 pairs spaced, (6)9–17 mm long, (3)6–15 mm broad, broadly ovate deeply and palmately incise-dentate, with 3–7 (usually 5) deltoid-lanceolate, elongated and subobtuse teeth, asperate along margin, covered on both surfaces with simple and glandular (sometimes very few) hairs. Inflorescence (2)4–14(20) cm long, with 5–14 internodes, spicate, sometimes subcapitate, interrupted in lower part; flowers single in axils of floral leaves, latter similar to cauline leaves, but usually with narrower and subacute teeth (generally 3 in upper leaves). Calyx (8)10–13(14) mm long, tubular-campanulate, slightly narrowed at teeth base, with 6–9 mm long, scarious, whitish or generally reddish tube, with 4 dark veins, inflated in fruit and with 3–5(6) mm long, linear-lanceolate, subacute teeth; teeth not scarious, green; calyx pubescent outside (on both surfaces of teeth) with simple hairs mixed with glandular hairs. Corolla 12–14(15) mm long, purple,

645 with (8)9–10 mm long tube, slender, paler in color, with 3–4.5 mm long limb, pilose outside with galeate upper lip; lower lip longer than upper, reflexed, with ovate (1–1.25 mm long) lobes, obtuse, middle lobe slightly narrower and longer than lateral lobes. Stamens included under upper lip, filaments flat, anthers orbicular with lobes pointed in lower part, usually pilose along slits, rarely glabrous. Style 7–9 mm long, later often twisted looplike in middle diffusely pilulose; stigma thick, bilobed. Capsule about 1 cm long, 3 mm broad, flattened, lanceolate, tapering in upper part, gradually narrowed and transformed into style, glabrous throughout. Seeds 0.5 mm long, 0.25–0.3 mm broad, numerous, elliptical, almost smooth (scarcely longitudinally rugose), light brown. April to May (Plate XXXII, fig. 1).

Sandy banks and damp meadows in riverine valleys, grassy slopes and scrub.—*Caucasus*: Dagestan, western and eastern Transcaucasia, Talysh. *General distribution*: Mediterranean Region (western part), Balkan States—Asia Minor, Iran. Described from Italy. Type in London.

2. *P. flaviflora* (Boiss.) Nevski in Tr. Bot. inst. Akad. Nauk SSSR, I, 4 (1937) 321.—*Eufragia latifolia*  $\beta$ . *flaviflora* Boiss. Fl. or. IV (1879) 473.—*E. flaviflora* Pavl. in Sov. bot. I (1934) 27.

Annual. Well-developed plant, 8–25 cm tall, with erect, slender, yellowish stem, almost always single, pubescent with simple and glandular hairs. Cauline leaves 3–6 pairs, (4)5–15 mm long, (2)3–10 mm broad, ovate or oblong-ovate, rarely broadly ovate, lowermost (1–3 pairs) closely crowded, dying off by flowering stage, shallowly dentate or subentire, others (2–3 pairs) with 7 or 5 (rarely with 3) lanceolate or linear-lanceolate obtuse teeth; all leaves covered with simple and glandular hairs on both surfaces (less densely beneath and mainly along veins). Flowers on very short pedicels (about 1 mm long), single in axils of floral leaves, forming spicate, 2–9(12) cm long inflorescence with (2)4–10 internodes, denser in upper part, often subcapitate, interrupted in lower part; floral leaves usually slightly longer than cauline, oval or ovate, generally with 5 or (upper leaves) with 3 deeper, narrower and subacute teeth, pubescent on both surfaces with simple and glandular hairs. Calyx 8–12 mm long, with 5–9 mm long tube, scarious, whitish, with 4 dark veins and greenish 2–3 mm long teeth. Corolla (10)11–13(14) mm long, yellow, slender, with lighter 8–10 mm long tube. Style 5–8 mm long. Capsule 9.5–10 mm long, 2.5–3 mm broad; otherwise similar to preceding species. April to May (Plate XXXII, fig. 2).

646 In riverine valleys along sandy banks, in damp meadows, on grassy slopes, in mountains and hills.—*Soviet Central Asia*: Syr Darya, Pamir-Alai, mountainous Turkmenia. *General distribution*: Mediterranean



Plate XXXII.

1. *Parentucellia latifolia* (L.) Caruel.—2. *P. flaviflora* (Boiss.) Nevski.—3. *P. viscosa* (L.) Caruel.



Region (eastern part), Iran. Described from Southern Iran. Type in Geneva.

Series 2. *Viscosae* Golubk.—Plant larger. Leaves oblong, crenate-serrate. Inflorescence elongated, flowers large. Capsule pilose in upper part.

3. *P. viscosa* (L.) Caruel in Parl. Fl. Ital. VI (1885) 482; Grossh. Fl. Kavk. III, 399.—*Bartsia viscosa* L. Sp. pl. (1753) 602.—*Rhinanthus maxima* Lam. Encycl. méth. II (1790) 61, non Willd.—*R. viscosa* Lam. Fl. Fr. II (1795) 354.—*Trixago viscosa* Rchb. Fl. Germ. exc. (1830–1832) 360; Gris. Spicil. fl. Rum. and Bith. II, 13.—*Eufragia viscosa* Benth. in DC. Prodr. X (1846) 543; Ldb. Fl. Ross. III, 1, 259; Rchb. Ic. fl. Germ. XX, 54; Boiss. Fl. or. IV, 474.—*Ic.*: Rchb. Ic. Fl. Germ. XX, tab. 1726.

Annual. Stem (10)15–35(50) cm tall, erect, simple or branched, covered with patent, yellowish, rigid bristles at base, with glandular and simple hairs in upper part. Leaves (12)15–30(40) mm long, 4(5)–10(14) mm broad, oblong-lanceolate or oblong, subobtuse, crenate-serrate along margin, with 3–10 small teeth on either side, covered on both surfaces (generally only along veins beneath) with short bristles and glandular hairs, gradually transformed into lanceolate bracts, with 1–3 teeth on either side or (upper bracts) entire. Flowers axillary, solitary, on very short (1–1.5 mm long) pedicels, pubescent similarly to stem; inflorescence 3–15(25) cm long, spicate, interrupted in lower part. Calyx 11–17 mm long, narrowly campanulate, light green, covered outside, on teeth and inside with glandular and simple hairs; teeth linear-lanceolate, darker in color, slightly shorter than tube. Corolla yellow, 15–25 mm long, with 10–17 mm long tube, sparsely puberulent outside and in upper part (mainly on upper lip); upper lip 4–6 mm long, galeate, shorter than lower lip; lower lip 7–9 mm long, with broadly ovate lobes, middle lobe equaling lateral lobes or slightly longer. Filaments flat; anthers pilose, pointed in lower part. Style 13–15 mm long, covered more densely than in other species of the genus with short, patent or oblique-antrorse hairs; stigma thick, bilobed. Capsule 9–10 mm long, 2.5–3 mm broad, flattened, lanceolate, pilose in upper part. Seeds about 0.5 mm long, 0.25 mm broad, numerous, elliptical, almost smooth (obscurely tuberculate). April to May (Plate XXII, fig. 3).

In meadows and among scrub.—*Caucasus*: eastern Transcaucasia, Talysh. *General distribution*: Atlantic Europe, Western Mediterranean Region, Balkan States-Asia Minor, Armenia-Kurdistan, Iran. Described from England. Type in London.

Genus 1355. *ORTHANTHA*<sup>1, 2</sup> (Benth.) Kern.

Kern. in Verh. zool.-bot. Ges. Wien, XXXVIII (1888) 566.—*Odontites* sect. 2. *Orthantha* Benth. in DC. Prodr. X (1846) 550; Ldb. Fl. Ross. III, 1, 261. —*Bartsia*, sect. 6. *Orthantha* Benth. and Hook. Gen. pl. II (1876) 978.

Flowers on very short pedicels, in somewhat dense or lax, spicate inflorescence. Bracts linear-lanceolate or lanceolate. Calyx tubular-campanulate, 4-toothed with triangular or lanceolate teeth, upper teeth slightly broader and longer than lower. Corolla yellow or purple, with short (3–6 mm long) tube and bilabiate limb, pubescent along margin and outside, upper lip galeate, sinuate at tip, margin unreflexed, lower lip 3-lobed, almost equaling or slightly shorter than upper lip, with obtuse lobes, sometimes slightly sinuate. Stamens 4, anthers glabrous, recurved in closed flowers, in open flowers spreading in front; anther lobes 1/3–1/2 connate at base, free above, all cuspidate or not. Fruit an oblong or ovate capsule, pilose above. Seeds few, pendent, longitudinally sulcate. Semiparasitic annuals. Stems erect, branched upward. Leaves opposite (sometimes opposite and alternate), linear, linear-lanceolate or lanceolate, entire or dentate.

Of the three species of this genus, distributed in Europe, Caucasus and Asia Minor, two are found in the USSR.

1. Calyx 3–3.5(4) mm long, teeth triangular, 1/2 as long as tube; corolla 6–7 mm long, pubescent in throat; stamens exserted; anther lobes cuspidate at tip; capsule 3.5 mm long ..... 1. *O. lutea* (L.) Kern.
- + Calyx 6–8 mm long, teeth lanceolate, equaling tube; corolla 8–9 mm long, glabrous in throat; stamens not exserted; anther lobes rounded at tip; capsule 7–8 mm long ..... 2. *O. aucheri* (Boiss.) Wettst.

1. *O. lutea* (L.) Kern. ex Wettst. in Pflanzenfam. IV, 3b (1895) 101; Grossh. Fl. Kavk. III, 399.—*Euphrasia lutea* L. Sp. pl. (1753) 604; Schmalh. Fl. II, 285.—*Odontites lutea* Rchb. Fl. Germ. exc. (1830–1832) 359; Benth. in DC. Prodr. X, 550; Boiss. Fl. or. IV, 475; Ldb. Fl. Ross. III, 1, 261; Grossh. Opred. rast. Kavk. 318.—*Bartsia lutea* Rchb. Ic. fl. Germ. XX (1862) 56.—*Ic.*: Wettst. in Denkschr. Acad. Wiss. Wien, LXX, tab. II, f. 4; Hegi, Illustr. Fl. Mittel-Eur. VI, 1, tab. 245, f. 5.

Annual. Stem erect, straight or sometimes flexuous, (6)10–35(4) cm tall, pubescent with short, recurved, crispate hairs, slightly 4-angled in lower part, simple, cylindrical in upper part, branched, branches straight

<sup>1</sup> Treatment by V.F. Golubkova.

<sup>2</sup> From the Greek *orthos*—straight, and *anthos*—flower.

or arcuate. Leaves (3)6–27 mm long, (0.7)1–2 mm broad, linear or linear-lanceolate, subobtusate, flat or often sulcate, entire or (lower) with few small teeth (1–2 on either side) with midrib depressed on upper surface and prominent beneath, appressed-pilose on both surfaces (sometimes only beneath). Flowers in terminal, many-flowered, unilateral, rather dense, spicate inflorescence; inflorescence straight or slightly flexuous, 2(4)–10 cm long, 14 cm long in fruit. Bracts lanceolate-linear, 6–8 mm long, 1.25–2 mm broad, all bracts shorter than flowers or only lower longer, with pubescence similar to that of leaves. Pedicels 0.5–1(1.5) mm long, pilulose. Calyx 3–3.5(4) mm long, tubular-campanulate, pilose outside, with 4 triangular teeth 1/2 as long as tube. Corolla yellow, 6–7 mm long, with lips pubescent outside and along margin, pilose in throat; upper lip galeate, sinuate, 2–2.5 mm long, lower lip almost equaling upper, 3-lobed, lobes ovate, truncate at tip, scarcely sinuate. Stamens exserted; filaments adnate up to 1/2 with corolla tube, pubescent in lower part, anthers oblong-ovate, with lobes slightly narrowed above, cuspidate. Style 5–6 mm long, pilose in lower half; stigma capitate, scarcely thicker than style. Capsule 3.5 mm long, 2 mm broad, ovate, slightly compressed on valvular side, obtuse, slightly emarginate, beaked (rarely beakless), rather densely pilose in upper free part. Seeds 1.25–1.5 mm long, 0.5 mm broad, with short, longitudinal, somewhat winged ribs, transversely rugose in-between, dark brown. May to August (September).

In steppes, in meadows, along calcareous, chalky and sandy slopes.—*European USSR*: Middle Dnieper, Volga-Don, Black Sea Region, Lower Don, Crimea; *Caucasus*: Ciscaucasia, Dagestan. *General distribution*: Central Europe. Described from Southern Europe. Type in London.

2. *O. aucheri* (Boiss.) Wettst. in Pflanzenfam. IV, 3b (1895) 161; Grossh. Fl. Kavk. III, 399.—*Odontites aucheri* Boiss. Diagn. pl. or. 1, No. 4 (1844) 74; Benth. in DC. Prodr. X, 550; Boiss. Fl. or. IV (1879) 475; Grossh. Opred. rast. Kavk. 317.

649 Annual. Stem 10–40 cm tall, erect, straight or slightly flexuous, pubescent with recurved, crispate hairs, simple in lower part, branched above, branches slender, straight, sparsely leafy. Leaves 5–14(20) mm long, linear, entire, generally sulcate, puberulent on both surfaces. Flowers in rather lax, 2(4)–12 cm long spicate inflorescence. Bracts lanceolate-linear, 5–9 mm long, with pubescence similar to that of leaves. Pedicels about 0.5 mm long (2–3 mm long in fruit). Calyx 6–8 mm long, tubular-campanulate, with lanceolate teeth equaling tube, pubescent inside as well as outside in upper part of teeth. Corolla purple or yellow, 8–9 mm long, with 4–5 mm long tube, slightly broadened around ovary, with bilabiate, 2.5–3 mm long limb, pilulose outside and along slightly wavy margin, glabrous in throat; upper lip galeate, sinuate, lower lip with 3 slightly



concave, oblong-ovate lobes, shallowly sinuate at tip. Stamens included, filaments 2/3–3/4 adnate with corolla tube; anthers oblong-globose, lobes obtuse at tip, not cuspidate. Seeds 1.5 mm long, 0.5–0.8 mm broad, with slightly winged longitudinal ribs, transversely rugose in-between, dark brown. June to August.

On dry grassy slopes.—*Caucasus*: eastern Transcaucasia (Georgia), southern Transcaucasia: *Soviet Central Asia*: mountainous Turkmenia, *General distribution*: Balkan States-Asia Minor, Armenia-Kurdistan. Described from Armenia. Type in Geneva.

### Genus 1356. *ODONTITES*<sup>1, 2</sup> Zinn

Zinn, Cat. pl. hort. Gott. (1757) 289.—*Bartsia* sect. 5 *Odontites* Benth. and Hook. Gen. pl. II (1876) (978).

Flowers in unilateral spicate inflorescence at stem ends in axils of floral leaves. Calyx tubular or campanulate, 4-toothed. Corolla yellow or red, with short tube slightly broadened above and bilabiate limb; upper lip slightly bulging, with unreflexed margin, entire or sinuate above, rarely somewhat bilobed, lower lip with 3 elongated or ovate, obtuse, entire lobes. Stamens 4, upper slightly shorter than lower; anther lobes pubescent, with equal cusps at lower ends. Style pilose; stigma capitate, lanate. Capsule slightly compressed, bilocular, bivalved. Seeds pendent, longitudinally sulcate. Annuals (in USSR), semiparasitic, green plants with erect, generally straight stems and opposite, dentate, rarely entire leaves.

This genus includes about 45 species, most of which are distributed in Mediterranean Region and Central Europe, and some in Asia.

- 650 1. Corolla yellow; plant pubescent throughout with simple and glandular hairs ..... 5. *O. glutinosa* (M.B.) Benth.  
 + Corolla reddish; plant pubescent only with simple hairs ..... 2.  
 2. Stem usually simple, rarely with 1–2 pairs of opposite branches, 7–20 cm tall; inflorescence few-flowered (4–14 flowers); cauline leaves few (1–4 pairs), lanceolate or oblong-ovate, rounded at tip .....  
 ..... 4: *O. litoralis* Fries  
 + Stem somewhat profusely branched, rarely simple, 10–40 cm tall; Inflorescence many-flowered (8–50 flowers); cauline leaves numerous, lanceolate or linear-lanceolate, subacute ..... 3.  
 3. Cauline and floral leaves slightly fleshy; capsule usually slightly shorter than calyx or equaling it, tapering above ..... 2. *O. salina* Kotov.  
 + Cauline and floral leaves not fleshy; capsule (mature) generally slightly exceeding calyx, usually obtuse ..... 4:

<sup>1</sup> Treatment by V. F. Golubkova.

<sup>2</sup> From the Greek *odons*—tooth, since extract from plant was used for toothache.

4. Floral leaves (often excepting lowermost) equaling flowers or slightly shorter; stem branched in lower part, branches spreading; calyx 5–6 mm long. Flowering from June to October ... 1. *O. serotina* (Lam.) Dum.
- + Floral leaves (especially lower) usually 2 times as long as flowers; stem branched only in upper part, branches somewhat appressed to stem; calyx 6–8 mm long. Flowering from May to July ..... 3. *O. verna* (Bell.) Dum.

1. *O. serotina* (Lam.) Dum. Fl. Belg. (1872) 32; Kryl. Fl. Zap. Sib. X, 2488.—*O. serotina* (Lam.) Rchb. Fl. Germ. exc. (1830–1832) 359; Grossh. Fl. Kavk. III, 400.—*O. rubra* Gilib. Fl. lith. I (1781) 126.—*O. rubra* Pers. Syn. pl. II (1807) 150; Benth. in DC. Prodr. X, 551, p.p.; Ldb. Fl. Ross. III, 1, 261, p.p.—*O. rubra* Pers. var. *serotina* (Lam.) Prantl. Excurs. Bayern, 2 (1884) 430.—*Euphrasia odontites* L. Sp. pl. (1753) 604; Schmalh. Fl. II, 285.—*E. serotina* Lam. Fl. Fr. II (1778) 350.—*Exs.*: GRF, No. 1176, 1176<sup>a</sup>.— *Ic.*: Rchb. Ic. fl. Germ. XX, tab. 1727, f. 1–10.

Annual. Stem 10–40 cm tall, erect, generally profusely branched in lower part, sometimes simple, branches arcuate, usually widespread, pubescent similarly to stem, with rather dense, simple, recurved hairs. Leaves (1)1.5–3(5) cm long, (1)3–10 mm broad, sessile, lanceolate or linear-lanceolate, subacute, with shallow, sometimes indistinct, distant, subobtusate teeth along margin, 2–7 on either side, with midrib depressed on upper surface and prominent beneath, appressed-pilose on both surfaces (generally only along veins beneath) and along margin. Flowers on 0.5–2 mm long pedicels in rather dense, 8–50-flowered, unilateral 651 (1.5)3–14(18) cm long spicate inflorescence; floral leaves usually (very often excepting lower) shorter than or equaling flowers, 6–17 mm long, 2–5 mm broad, linear-lanceolate, with shallow distant teeth similarly to leaves or (generally upper) entire, appressed-pilose, often (especially lower) deflexed or recurved. Calyx (4)5–6(7) mm long, tubular-campanulate, with triangular teeth almost equaling tube, densely pubescent outside as well as inside on teeth with simple appressed hairs. Corolla reddish, 1.5–2 times as long as calyx, (7)8–10(11) mm long (measured from upper lip), tube 4–6 mm long, upper lip slightly galeate, slightly sinuate or bilobed above, exceeding lower lip; lower lip with 3 oblong lobes, lateral lobes obtuse or subacute, middle lobe slightly broader and longer, shallowly sinuate above; corolla pubescent outside in upper part with rather dense hairs, sparsely appressed-hairy inside near limb. Stamens slightly exerted, filaments glandular (not up to tip; glands visible only under powerful lens); anther lobes free and cusped in lower part, usually with hairy tuft at tip, lanate in place of filament insertion. Style 6–8 mm long, pilose, stigma capitate. Capsule often slightly longer than calyx, 5–8 mm long, oblong, usually obtuse, with short mucro, pilose in upper

part. Seeds few (10–20 in each chamber), oblong-ovate, 1.25–1.5 mm long, 0.7–0.8 mm broad, longitudinally ribbed, transversely rugose in between. July to October (Plate XXXIII, fig. 1).

In fields, meadows, near roads, in marshy places, near ditches, along slopes of railway tracks and ravines.—*European USSR*: all regions: *Caucasus*: Ciscaucasia, Dagestan, western and eastern Transcaucasia; *Western Siberia*: Ob' Region (south), Upper Tobol, Irtysh, Altai Mountains; *Eastern Siberia*: Lena-Kolyma (south), Angara-Sayan, Dauria; *Soviet Far East*: Zeya-Bureya, Uda Region; *Soviet Central Asia*: Aral-Kaspian Region, Balkhash Region, Dzh.-Tarbagatai, Syr Darya, Pamiro-Alai, Tien Shan. *General distribution*: Western Europe (excepting extreme north of Scandinavia), Balkan States-Asia Minor, Iran, Dzh.-Kashgar, Mongolia (north), China (northern Manchuria). Described from France. Type in Paris.

*Note*. Regel (Bull. Soc. Nat. Mosc. XLI (1868) No. 1, 105), on the basis of his study of the plant collected in the initial flowering stage by Semenov from Lake Issyk-Kul (Kyzylsu Bay), described the new species *O. breviflora* Rg., noting that *O. rubra* Pers. which is closely related to it, differs by anthers being shorter than the galea (and not slightly exserted and horizontal) and sparsely lanate at tip with matted hairs (and not glabrous, and shortly barbate only along the cleft margins), by the stem generally being very profusely branched (and not simple or less often, weakly branched above) and by the corolla being almost two times  
652 as long as the calyx. On the basis of the study of a typical specimen, it should be noted that its anthers, in spite of Regel's indication, are vertical, as in *O. serotina* (Lam.) Dum., glabrous along the cleft and also pilose at the place of insertion of the filaments. It may be assumed that, of the distinctive characteristics indicated by Regel, deserving attention, are such features as the shorter flowers (7–8 mm long) with the corolla up to 1.5 times as long as the calyx (as may be judged from a typical plant with the flowers still unopened), and the glabrous anthers above anthers, as also the simple or weakly branched stems. On the basis of the inadequate material it is not possible for us to resolve finally the question of specific status for *O. breviflora*.

2. *O. salina* Kotov in Bot. zhurn. Akad. Nauk USSR, IV, 1–2 (1947) 76.—*O. serotina salina* Kotov in Zhurn. Russk. bot. obsch. XVI (1931) 457.

Annual. Plant hirtellous. Stem 15–40 cm tall, branched above, appressed-puberulent. Leaves slightly fleshy, linear-lanceolate, with shallow spaced teeth along margin, subacute, 0.7–3 cm long, 2–5 mm broad; floral leaves (excepting lowermost) equaling flowers, 8–13 mm long, 3–4 mm broad, slightly fleshy, linear-lanceolate, subacute, similarly to cauline leaves. Calyx 7–9(10) mm long, with ovate-lanceolate, 3–4 mm



long teeth. Corolla 9–12 mm long. Capsule oblong-ovate, acuminate, 7–9 mm long, usually shorter than or equaling calyx. Seeds 1.7–1.9 mm long, 0.7–0.9 mm broad. In other respects similar to *O. serotina* (Lam.) Dum. July to September.

Coastal salt marshes, rarely near saline lakes.—*European USSR*: Black Sea Region. Endemic. Described from Biryuchi Island (in Azov Sea). Type in Kiev. Topotype in Leningrad.

*Note.* *O. salina* Kotov is close to *O. serotina* (Lam.) Dum. and is distinguished by the fleshy cauline and bracted leaves, larger flowers and fruits, capsule generally equaling the calyx and even slightly shorter with an acute tip and also shorter pubescence.

3. *O. verna* (Bell.) Dum. Fl. Belg. (1827) 32; Benth. in DC. Prodr. X, 551, p.p.—*O. verna* (Bell.) Rchb. Fl. Germ. exc. (1830–1832) 359; Ldb. Fl. Ross. III, 1, 261, p.p.—*O. rubra*  $\beta$ ? *verna* Pers. Syn. pl. II (1807) 150.—*Bartsia verna* Rchb. Ic. fl. Germ. XX (1862) 57.—*Euphrasia verna* Bell. in Mem. Acad. Turin, V (1790–1791) 1793, 293.—*Exs.*: Pl. Finl. exs. 655 Nos. 923, 924.—*Id.*: Rchb. Ic. fl. Germ. XX, tab. 1728, f. 7–12.

Annual. Stem 15–40 cm tall, erect, usually branched above, rarely simple; branches fewer and more distant, compared with *O. serotina* (Lam.) Dum., diverging at acute angle and somewhat appressed to stem, somewhat densely pubescent with simple, recurved hairs. Leaves 1–5 cm long, (2)3–10 mm broad, lanceolate, subacute, with 1–5 subacute teeth on either side, appressed-pubescent on both surfaces; all floral leaves (lower 2 times or more) usually longer than flowers, 8–30 mm long, 2–8 mm broad, similar to cauline leaves in shape and pubescence. Calyx 6–8(9) mm long, accrescent in fruit, teeth lanceolate, rarely triangular, almost equaling tube. Corolla (7)8–11(12) mm long. Capsule slightly exceeding calyx. In other respects, similar to *O. serotina*. May to July (August) (Plate XXXIII, fig. 2).

In plowed land and fields, in meadows.—*European USSR*: Ladoga-Ilmen, Upper Dniester. *General distribution*: all Western Europe excepting northern part of Scandinavia, central and southern part of Italy, Greece. Described from northern Italy. Type in Turin.

*Note.* The phenomenon of seasonal dimorphism is observed in species of the genus *Odontites*. *O. verna* (Bell.) Dum. is an early-flowering species, while *O. serotina* is late-flowering. Sometimes their morphological differences are so insignificant that some authors (Bentham, Ledebour) were inclined not to acknowledge *O. verna* (Bell.) Dum. as a separate species. Wettstein (Denkschr. Acad. Wiss. Wien, LXX (1901) considers it necessary to distinguish these two species. Experiments conducted by him in growing plants of these species from seeds showed their distinctive features to be inherited. We do not find it possible to

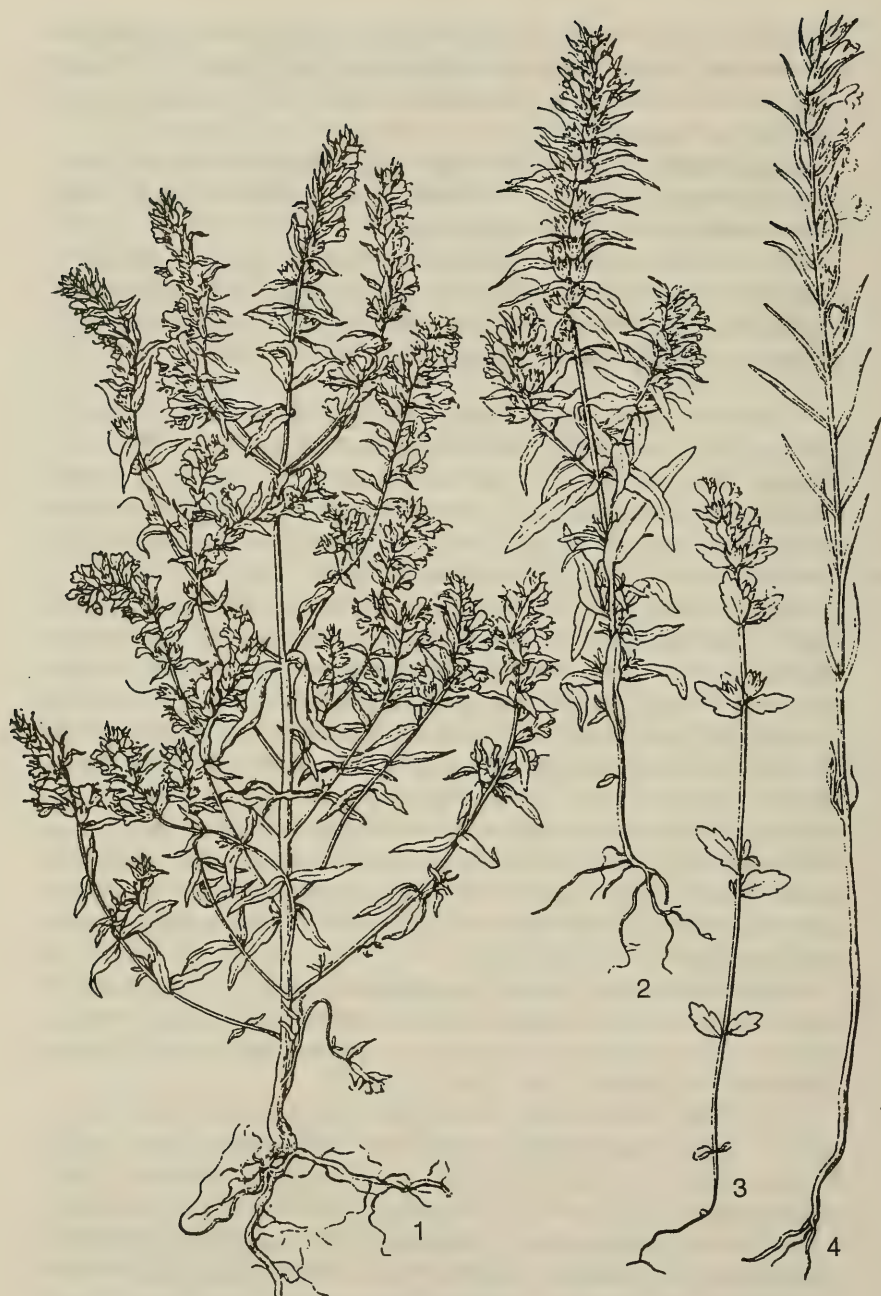


Plate XXXIII.

1. *Odontites serotina* (Lam.) Dum.—2. *O. verna* (Bell.) Dum.—3. *O. litoralis* Fries.—4. *O. glutinosa* (M.B.) Benth.

combine these species because of differences (see in key) well expressed in the typical forms.

4. *O. litoralis* Fries, Summa veg. Scand. I (1846) 19.—*O. simplex* Krok ex Nym. Consp. Fl Europ. (1878–1882) 551.—*Euphrasia litoralis* Fries. l.c.—*Bartsia odontites* Huds. b. *litoralis* Rchb. Ic. fl. germ. XX (1862) 58.—*l.c.*: Rchb. l.c. tab. 1727, f. 11, 12.—*Exs.*: GRF, No. 429.

Annual. Stem (5)7–20(30) cm tall, erect, simple, rarely with 1–2 pairs of opposite branches in upper part, sparsely leafy, appressed-pubescent. Cauline leaves 1–4 pairs, 0.6–2.6 cm long, 3–9 mm broad, lanceolate-ovate or oblong-ovate, rounded at tip, with 1–4 obtuse or subobtuse, shallow, distant teeth on either side, appressed-pubescent on both surfaces, slightly fleshy; floral leaves similar to cauline leaves in shape and 656 pubescence, spaced or obliquely upturned, 0.5–2.5 cm long, 2.5–7 mm broad, lower (or almost all) leaves longer than flowers, upper or only uppermost leaves equaling flowers or shorter, sometimes subentire. Inflorescence 2.5–6(7) cm long, 4–14-flowered, spaced in fruit. Calyx 6–8 mm long, campanulate, broader than in preceding species, with broad deltoid teeth almost equaling tube or a little shorter, intensely accrescent after flowering, puberulent outside and inside on teeth. Corolla 8–11 mm long, purple, sparsely pubescent outside in upper part and inside in throat. Anthers usually glabrous above. Capsule 6–9 mm long, oblong-ovate, slightly exceeding or equaling calyx, obtuse, with small mucro at tip. In other respects, similar to *O. verna* (Bell.) Rchb. May to July (Plate XXXIII, fig. 3).

In coastal and saline meadows. *European USSR*: Ladoga-Ilmen. *General distribution*: Scandinavia (excepting Norway). Described from Scandinavia. Type in Stockholm?

*Note.* *O. litoralis* Fries is close to *O. verna* (Bell.) Dum. and differs from it by the shorter, sparsely leafy, usually simple stem, broader and slightly thicker leaves, broader calyx and longer capsule.

5. *O. glutinosa* (M.B.) Benth. in DC. Prodr. X (1846) 549; Ldb. Fl. Ross. III, 1, 260; Boiss. Fl. or. IV, 475; Grossh. Fl. Kavk. III, 400.—*Euphrasia glutinosa* M.B. Fl. taur.-cauc. II (1808) 70; Schmalh. Fl. II, 285.—*E. viscosa* Pall. Ind. Taur. ex M.B. l.c.—*l.c.*: Rouy. Illustr. Pl. Eur. rar. 7, tab. 164.

Annual. Stem (6)9–30(40) cm tall, erect, simple, rarely branched, pubescent with fine, white, crispate, recurved, simple hairs and thicker, short, spaced, large-headed, yellow glandular hairs, glands sparse at stem base. Leaves 7–22 mm long, 1–2.5 mm broad, opposite, sessile, linear, generally only glandular or sometimes glabrous on upper surface, covered beneath with rather dense, short, fine, simple hairs, sparsely mixed with glandular hairs, usually glandular-ciliate along margin. Flowers on short



pedicels (1–1.5 mm long) in slender, almost always unilateral, sparse, (2)3–6(10) cm long spicate inflorescence. Bracts (8)10–20(23) mm long, (1)2–2.5(3) mm broad at base, 1.5–2 times as long as calyx, linear-lanceolate, especially lower bracts markedly broadened in lower part, pubescent similarly to leaves. Calyx 7–8 mm long, campanulate, hairy and glandular outside also inside on teeth, teeth exceeding tube, linear-lanceolate, glandular-ciliate along margin. Corolla 13–15 mm long, yellow, pubescent outside in upper part, glabrous inside, with slender, slightly curved tube; upper lip galeate, shorter than lower, lower lip with obtuse, 657 entire or scarcely sinuate, broadly ovate lobes. Stamens included, with filaments  $2/3$ – $3/4$  adnate with tube; anthers ovoid orbicular lobes free in lower part and tapering into sharp point, pilose along clefts. Style 9–11 mm long, sparsely pilose, slightly thickened above; stigma capitate, lanate. Capsule 9–10 mm long, 3.5–4 mm broad, oblong, compressed, truncate at tip, with small mucro. Seeds 10–15 in each locule, 2–2.5 mm long, 1–1.2 mm broad, light yellow, with oblong (sic) ribs, transversely rugose in between. (July) August to September (Plate XXXIII, fig. 4).

Dry mountain meadows and stony slopes in steppe.—*European USSR*: Crimea (Yaila); *Caucasus*: western, eastern and southern Transcaucasia. *General distribution*: Balkan States-Asia Minor, Armenia-Kurdistan. Described from Crimea (Mt. Chatyr-Dag). Type in Leningrad.

### Genus 1357. *BARTSIA*<sup>1, 2</sup> L.

L. Sp. pl. (1753) 602; Behth. and Hook Gen. pl. II (1876) 977.

Flowers in leafy racemes. Calyx tubular or campanulate, 4-toothed. Corolla with comparatively long tube and bilabiate limb, with anthocyanin pigmentation, upper lip galeate, entire or sinuate above, with non-replicate margin, lower lip 3-lobed. Stamens 4, didynamous; anther lobes generally pilose, mucronate at lower ends. Style obtuse at tip, rarely with thickened stigma. Capsule ovate or oblong, thin-walled. Seeds few, horizontally diverging, longitudinally ribbed or winged. Perennials, rarely annual herbs with opposite, generally crenate or serrate leaves; upper leaves amplexicaul.

Of 30 species of this genus, 6 are distributed in Old World (in Europe and North Africa), and 24 in South America.

1. *B. alpina* L. Sp. pl. (1753) 602; Benth. in DC Prodr. X, 544; Ldb. Fl. Ross. III, 2, 260; Kryl. Fl. Zap. Sib. X, 2489.—*Rhinanthus alpina* Lam Fl. Fr. II (1795) 354.—*Is.*: Fedtsch. and Fler. Fl. Evrop. Ross. fig. 842.—*Exs.*: Pl. Finl. *exs.*: No. 922.

<sup>1</sup> Treatment by V. F. Golubkova.

<sup>2</sup> Named after the doctor and botanist (John Barts, 1970), a friend of Linnaeus.

Perennial. Stems (10)12–30 cm tall, rather numerous, simple, ascending or erect, pubescent with crispate white hairs ending into small black glands, more densely glandular in upper part. Leaves (7)10–24(30) mm long, (5)6–14(20) mm broad, opposite, sessile, ovate or oblong-lanceolate, with 6–13 small teeth on either side, subobtuse, pubescent with simple hairs on both surfaces, sometimes only beneath mainly along veins; lower leaves smaller, lowermost leaves almost scalelike and entire, more densely crowded. Flowers single, axillary, in short (4–8 cm long) leafy raceme, more lax in lower part. Pedicels short (1.5–2 mm long), glandular. Calyx 7 mm long, campanulate, with 3 teeth almost as long as tube, glandular outside and also on teeth tips inside. Corolla dark violet, (13)15–18 mm long, rather densely glandular-pubescent outside, inside generally with scattered, short, simple hairs; upper lip bulging, truncate at tip, scarcely exceeding lower lip; lower lip with 3 identical lobes (1–1.5 mm long), rounded at tip, sometimes acute. Stamens under upper lip, scarcely exerted from corolla, filaments 1/2 or less adnate with corolla tube; anther lobes acute at lower end, orbicular ovate, white-hairy. Style slender, 15–21 mm long, somewhat exerted, puberulent, slightly thickened and flattened above, glabrous at tip; stigma scarcely thicker than style. Capsule oblong-ovate, 9.5–11 mm long, 4.5–6 mm broad, hairy above, generally with persistent style. Seeds 1.8–2 mm long, 1.2–1.3 mm broad, 15–30 per locule, ribs somewhat winged, transversely rugose. June to July.

In alpine meadows, near melting snow, along river banks.—*Arctic Region*: Arctic Europe. *European USSR*: Karelia-Lapland, Dvina-Pechora. *General distribution*: Arctic Region (Greenland, Iceland). Scandinavia, Central Europe (mountains), Atlantic Europe, North America (Labrador, Newfoundland). Described from Lapland. Type in London.

### Genus 1358. *BELLARDIA*<sup>1, 2</sup> All.

Fl. Pedem. I (1785) 61.—*Trixago* Stev. in Mém. Soc. Nat. Mosc. VI (1823) 4, non Hall.

Calyx campanulate, shortly 4-toothed, cleft in front and at back. Corolla distinctly bilabiate; upper lip galeate, lower 3-lobed. Stamens 4, didynamous; anther lobes acute at base. Capsule ovoid, inflated. Seeds numerous, horizontal, minute, longitudinally ribbed. Annual glandular-pubescent herbs with dentate leaves.

This genus includes 2–3 species distributed in the Mediterranean Region.

<sup>1</sup> Treatment by B. K. Schischkin.

<sup>2</sup> Named after Bellardi Carlo Antonio Lodovico, professor in Turin (1741–1826), who studied flora of Piedmont.

- 659 1. *B. trixago* (L.) All. Fl. Pedem. I (1785) 61; Grossh. Fl. Kavk. III, 400.—*Bartsia trixago* L. Sp. pl. (1753) 602.—*B. versicolor* Pers. Synops. II (1807) 151.—*Rhinanthus trixago* L. Syst. ed. XII (1767) 1102.—*R. versicolos* Willd. Sp. pl. III (1800) 191.—*Alectorolophus trixago* M.B. Fl. taur-cauc. II (1808) 69; III, 410.—*Trixago apula* Stev. in Mém. Soc. Nat. Mosc. VI (1823) 4; Ldb. Fl. Ross. III, 259; Boiss. Fl. or. IV, 477.—*Euphrasia trixago* Vis. Fl. Dalm. II (1847) 175; Schmalh. Fl. II, 286.— *Ic.*: DC. Ic. rar. tab. 19; Cusin, Herb. Fl. fr. XVII, tab. 116.— *Exs.*: Herb. Fl. Cauc. No. 448.

Annual. Stem erect, simple or sparsely branched, densely pubescent with recurved, simple, somewhat rigid hairs, glandular-pubescent above, 10–40 cm tall. Leaves opposite, oblong-lanceolate or sometimes sublinear, 1–5 cm long, 1–10 mm broad, sessile or amplexicaul, obliquely erect, almost appressed to stem, remotely dentate, teeth obtuse at tip. Inflorescence spicate, short at first, later elongated. Calyx teeth ovate, 1/5–1/4 as long as tube. Corolla 18–20 mm long, purple or multi-colored, lower lip exceeding upper; anthers sparsely pilose. Capsule ovate-spurlike. May to June.

In meadows and on grassy slopes. *Caucasus*: Dagestan, eastern Transcaucasia, Talysh. *General distribution*: Mediterranean Region. Described from Italy. Type in London.

### Genus 1359. *RHINANTHUS*<sup>1, 2</sup> L.

L. Sp. pl. (1753) 603.—*Alectorolophus* Hall. Hist. Helv. I (1768) 137.

Corolla bilabiate, upper lip galeate with somewhat prominent tooth at tip, lower lip flat, 3-partite. Stamens 4, two included in corolla, two exserted. Calyx laterally compressed, almost membranous, glabrous or pilose, sometimes glandular-pubescent, narrowed near throat (tip), 4-toothed, bladderlike inflated in fruit. Capsule laterally compressed, ovate-orbicular, dehiscent, enclosing seeds, resembling ear cavity, winged, rarely wingless. Annual semi-parasites, with opposite, serrate-dentate or crenate leaves and flowers in racemes with floral leaves. Apart from floral leaves, species of genus *Rhinanthus* are distinguished by usual cauline leaves and intercalary leaves, upward from last pair of branches, up to beginning of inflorescence.

- Note. 1. Linnaeus understood the genus *Rhinanthus* very broadly.  
660 Some species placed here by Linnaeus were transferred by later authors to the genus *Bartsia* L. (family Scrophulariaceae), and some to the genus *Gerardia* L. (of same family), while the species *R. indica* L. was included in the genus *Geniosporium* Wallr. (family Labiatae). Thus, only *R. cristagalli* L. s. l. was left in the genus *Rhinanthus*. However, all this does

<sup>1</sup> Treatment by I. T. Vasilchenko.

<sup>2</sup> From the Greek *rhinos*—nose, and *anthes*—flower.



not justify the rejection of the Linnaean generic name "*Rhinanthus*" and its replacement by the name "*Alectorolophus*". The latter, according to the rules of nomenclature, cannot be accepted, as it was proposed later (see: Thellung and Schinzi, in Bull. Herb. Boiss. Sec. sér., VII, 6 (1907) 443). But even the name *R. crista-galli* L. cannot be supported as a specific name and be used for any particular species of this genus. Linnaeus (1753) gave to the name *R. crista-galli* the generalized characterization of several varieties also extremely vague circumscription and which actually were species. In view of this, Linnaeus himself, three years after the publication of his work, chose to reject this name and gave detailed diagnoses of two species of the genus *Rhinanthus* (*R. major* L. Amoen. Ac. III (1756) 53 and *R. minor* L. l.c. 54) which were established by him. However, later authors continued arbitrarily to using the specific epithet *R. crista-galli* under most different senses. This served for a time as the source of a series of misunderstandings and the subject of a prolonged discussion in the literature, recently summed up by Schwarz [Schwarz, Zur Nomenclatur einiger *Rhinanthus*-Arten in Repert. sp. nov. XLVI (1939) 53]. Schwarz included *R. crista-galli* L. among the doubtful names ("nomen dubium"); it should therefore, be rejected. This, it should be added, was already done in the USSR independently of Schwarz by B. K. Schischkin in his treatment of the genus *Rhinanthus* in "Flora Zapadnoi Sibiri" [X (1939) 2530].

2. As is well known representatives of the genus *Rhinanthus* (as also the genus *Melampyrum* L.) served as the classic subjects for the description of the so-called phenomenon of "seasonal dimorphism," i.e., origin of early-flowering types (summer species) and late-flowering types (autumn species) as a result of prolonged human influence on the rattleweed through hay-making. This seems to have caused the development of early-flowering (before hay-making) types and late-flowering (after hay-making) types. Refer in this respect to Wettstein [Wettstein, I, Der Saeson-Dimorphismus als Ausgangspunkt für Die Bildung neuer Arten in Pflanzenreiche. Ber. Deutsch. bot. Gesellsch. XIII (1895); II, Untersuchungen über den Saeson-Dimorphismus im Pflanzenreiche. Denkschr. Akad. Wiss. Wien, LXX (1901) 305] and other authors.

As soon as Wettstein's work was published, the Russian botanist (from Kiev) I.V. Baranetsk put forward a critique observing the disparity between usual times of hay-making and of the flowering of the various races of rattleweed (see his work "Vydayuschiesya yavleniya v noveishiei literature o darvinizme", Kiev, 1903). N.V. Zinger, while reviewing this question  
 661 [Tr. Tifl. bot. sada, XII, 1 (1912)], though inclined in favor of Wettstein's argument, noted that he did not give sufficiently persuasive proof of the hypothesis on the origin of the rattleweed races.

Recently Wettstein's hypothesis has been subjected again to much criticism, most comprehensively reported in the works of the Hungarian botanist Soó, Syst. Monogr. *Melampyrum* in Fedde Repert. XXIII (1926-1927); Die mittel- u. südosteur. Art. u. Formen Gatt. *Rhinanthus*, ibid. XXVI (1929) and others]. Soó, after studying the question of seasonal dimorphism not only in connection with the genus *Rhinanthus*, but also the genus *Melampyrum*, arrived at the conclusion that the polymorphism of species of the genus *Rhinanthus* occurs basically because of ecological and geographical factors, among which the most important are the duration of the vegetative period and the local conditions of plant development. Soó considers the term "seasonal dimorphism" inappropriate and proposes instead "pseudoseasonal polymorphism" for this phenomenon, whereas for "summer" and "autumn" races, he recommends the designations "scrub race," "meadow race", "field race," "foothill race," "alpine race," etc., Similarly, Soó takes issue also with the hypothesis on the origin of the species with wingless seeds by means of slow artificial, gene, selection by the prolonged and primitive ancient practice of cleaning grain by means of wind), and notes that similar forms of seeds are present in several purely meadow types, which are never subjected to this process (see below, for example, *R. sachalinensis* Vass).

It is not possible to dwell in more detail upon the discussion that has arisen on this matter. We, therefore, shall note that the phenomenon of polymorphism in the species of the genus *Rhinanthus* (considering also their semiparasitic habit) needs thorough renewed research. Moreover, this work can bear fruit only if it is conducted on this basis of Michurin's teachings in biology, on the basis of studying the development of the species of the genus *Rhinanthus* in concrete environmental conditions and also the history of the formation of this genus. It is extremely difficult to specify the exact number of species in the genus *Rhinanthus* because of the abundance of small local forms, regarded by some authors as species. On the other hand, monographers such as Soó, Sterneck and some others combine species which differ from the size of the species usually recognized by Soviet authors. Very appropriately the genus *Rhinanthus* can be said to include nearly 100 species, distributed mainly in Europe. The species are arranged below according to the system proposed by Soó (1929), with some changes.

*Economic importance:* The species of the genus *Rhinanthus*, as is well known, are semiparasites, which adhere with their roots to other plants and weaken them. This fact, combined with the low food value of the rattleweeds, obliges us to consider them serious undesirable elements in meadows. Weeding (among other measures), is recommended for their removal from meadows. However, weeding should be done carefully, since

pulling out the rattleweed may injure those plants to which the semiparasite has attached itself.

1. Calyx pubescent throughout with simple glandular hairs .....2.
- + Calyx glabrous, usually shortly asperate only along (margin) sutures .....9.
2. Corolla 12–15 mm long .....3.
- + Corolla 18–22 mm long .....4.
3. Stem 5–10 cm tall; leaves 1–2(2.5) cm long (Alpine zone of Bolshoi Caucasus) .....23. *R. schischkinii* Vass.
- + Stem 15–30 cm tall; leaves longer. (Komandirovskie islands) .....18. *R. borealis* (Stern.) Druce.
4. Calyx glandular-pubescent .....5.
- + Calyx pubescent with simple (uni- or multicellular) hairs. ....6.
5. Internodes few; leaves lanceolate or oblong-lanceolate; intercalary leaves absent (Carpathian mountains) .....24. *R. rumelicus* Velen.
- + Internodes numerous, reduced; leaves very narrow, linear, (3–4 mm broad); intercalary leaves usually present .....25. *R. ösilensis* (Bonn. and Sarrs.) Vass.
6. Calyx covered with minute unicellular hairs .....7.
- + Calyx covered with long multicellular hairs (appearing chainlike) 8.
7. Internodes few, elongated; intercalary leaves absent or one pair ....22. *R. mediterraneus* (Stern.) Adamovic.
- + Internodes numerous (up to 15–30); intercalary leaves (4)5–7(9) pairs .....21. *R. colchicus* Vass.
8. Intercalary leaves absent (or one pair); leaves shorter than internodes .....19. *R. major* L.
- + Intercalary leaves 3–7 pairs; cauline leaves longer than internodes ..20. *R. patulus* (Stern.) Thell. and Schinz.
9. Seeds wingless .....10.
- + Seeds with distinct rounded wings .....11.
10. Seeds cordate- deltoid; corolla 16–17 mm long (Sakhalin) .....11. *R. sachalinensis* Vass.
- + Seeds resembling ear cavity; corolla 19–20 mm long. Other regions .....10. *R. apterus* (Fries) Ostenf.
- 663 11. Corolla 12–15 mm long, lower lip diverging, corolla throat usually open .....12.
- + Corolla larger; lower lip appressed to upper, corolla throat closed (with exception of *R. subalpinus*, where lower lip diverging) .....17.
12. Stem much branched from middle (rarely simple), with 9–15 (and more) reduced internodes; leaves linear-lanceolate or linear; intercalary leaves 2–7 pairs .....13.



- + Stem simple or branched with 4–9 (rarely more) elongated internodes; leaves linear-lanceolate to oblong-ovate; intercalary leaves absent or one pair ..... 14.
- 13. Bracts long (up to 5 mm) aristate; corolla tube curved; beak of upper lip up to 1.5 mm long ..... 13. *R. angustifolius* Gmel.
- + Bracts not aristate or short-aristate; corolla tube weakly flexuous or erect; beak of upper lip shorter ..... 12. *R. nigricans* Meish.
- 14. Stem fleshy, thickened, pilose; leaves oblong-ovate or broadly lanceolate, with large spaced teeth; bracts sparsely pilose, exceeding calyx. (Extreme north-west of European USSR) ..... 16. *R. groenlandicus* (Ostenf.) Chab.
- + Combination of characteristics different ..... 15.
- 15. Corolla yellow, about 15 mm long, with curved tube; beak of upper lip about 1.5–2 mm long; leaves linear-lanceolate or narrowly lanceolate (Carpathian mountains) ..... 17. *R. alpinus* Baumg.
- + Corolla brownish yellow, 12–15 mm long, with erect or slightly curved tube; beak of upper lip smaller; leaves oblong-lanceolate or lanceolate ..... 16.
- 16. Internodes elongated; stem (10)20–50 cm tall, somewhat thickened ..... 14. *R. minor* L.
- + Internodes much reduced; stem 4–8(12) cm tall, slender ..... 15. *R. rusticulus* (Chab.) Druce.
- 17. Branches numerous, closely appressed to stem; stem densely leafy; bracts 1.5–2 times as long as calyx ..... 18.
- + Branches not appressed to stem; stem less densely leafy; bracts equaling calyx or longer ..... 19.
- 18. Calyx (in fruit) 15–18 mm long; capsule 12–15 mm long ..... 8. *R. songaricus* (Stern.)-B. Fedtsch.
- + Calyx (in fruit) 10–12 mm long; capsule 8 mm long ..... 9. *R. ferganensis* Vass.
- 19. Bracts cristate-pinnatifid or incised, with distant subulate-lanceolate teeth; leaves sharply serrate-dentate ..... 20.
- 664 + Bracts not cristate, closely dentate leaves subobtusely- (often crenate-) dentate, rarely sharp-toothed ..... 21.
- 20. Leaves linear, long tapering, acuminate, closely serrate-dentate ..... 7. *R. subulatus* (Stern.) Soó.
- + Leaves oblong-lanceolate, with distant teeth ..... 6. *R. pectinatus* (Behrend.) Vass.
- 21. Capsule 7–8 mm long; seeds about 2 mm long ..... 3. *R. cretaceus* Vass.
- + Capsule and seeds larger ..... 22.
- 22. Stem profusely branched, with 18–30 reduced internodes and 3–8 pairs of intercalary leaves; cauline leaves narrowly lanceolate or linear-lanceolate; corolla 16–18 mm long ..... 1. *R. montanus* Saut.

- + Internodes fewer; intercalary leaves absent or 1–2 pairs ..... 23.
- 23. Stem usually profusely branched, rarely simple; internodes 10–18; leaves oblong- or ovate-lanceolate; intercalary leaves 1–2 pairs; corolla 19–22 mm long ..... 2. *R. aestivalis* (Zing.) B. Schisch. and Serg.
- + Combination of characteristics different ..... 24.
- 24. Calyx minutely glandular-asperate along margin (sutures). (Southern Transcaucasia) ..... 5. *R. ponticus* (Stern.) Vass.
- + Calyx asperate only along margin or subglabrous ..... 4. *R. vernalis* (Zing.) B. Schischk. and Serg.

Section 1. *Glabri* (Soó) Vass.—Sect. *Cleistolemi* subsect. *Glabri* Soó in Fedde, Repert. sp. nov. XXVI (1929) 199.—Calyx glabrous; corolla large (16–18 mm to 20–22 mm long).

1. *R. montanus* Saut. in Flora, XL (1857) 180; Kryl. Fl. Zap. Sib. X, 2532.—*R. angustifolius* Čelak. in Oesterr. Bot. Zeitschr. (1870) 130.—*R. serotinus* Schinz and Thell. Fl. Schweiz ed. 3 (1914) 315, non Gmel.—*Alectorolophus montanus* Fritsch. in Verh. Sool.-bot. Gesellsch. (1898) 322; Sterneck in Abh. zool.-bot. Gesellsch. Wien, I, 2, 73; in Oesterr. Bot. Zeitschr. XLV, 164.—*A. major* ssp. *montanus* Hayek in Hegi, Illustr. Fl. Mittel-Eur. VI, 108.—*lc.*: Sterneck in Oesterr. Bot. Zeitschr. XLV, tab. VII. fig. 18–21 (sub *Alector. montano*).—*Exs.*: GRF, No. 1530 and No. 2535-d (sub *Alector. montano*); Pl. Finl. exs. No. 1332; Fl. exs. austro-hung., No. 2608.

665 Annual. Stem erect, profusely branched from middle, subglabrous, with dark brown longitudinal lines, (20)30–65(100) cm tall; branches obliquely erect, usually arcuate ascending, often somewhat violet (like stem), upper branches equaling main stem or nearly so. Leaves longer than cauline internodes, lanceolate or linear-lanceolate, serrate-dentate, acuminate; lower leaves shedding before anthesis; internodes numerous, (15)18 to 30, with few (3–8) pairs of intercalary leaves between upper branches and inflorescence. Bracts glabrous, lanceolate-subulate with oval base, long acuminate, incise-dentate, with short-aristate teeth; lower teeth longer and broader than upper. Calyx glabrous, short-aristate only along lateral sutures, 10–15(18) mm long. Corolla yellow, 16–18 mm long, with slightly curved tube; upper lip with violet beak, 1.25–1.75 mm long; lower lip appressed to upper, corolla throat closed. Capsule orbicular, 9–10 mm long and broad. Seeds 2.75–3(4) mm long and almost as broad; wing 0.5–0.75 mm broad. August to September.

On sands and in light sandy soils in thin pine forests and among scrub thickets.—*European USSR*: Baltic Region, Ladoga-Ilmen, Volga-Kama, Upper Dniester, Upper Dnieper, Middle Dnieper, Upper Volga,

Volga-Don; *Western Siberia*: Upper Tobol, Ob' Region, Irtysh. *General distribution*: Central Europe, Scandinavia. Described from Salzburg. Type in Salzburg (?).

*Note*. According to N.V. Zinger's data (Spisok rast. GRF, No. 2535a), *R. montanus* blossoms much earlier in the north of its range than in the south, and northern plants of this species are less typical than southern, deviating in several features toward *R. aestivalis* (Zing.) B. Schischk. and Serg. In the north, *R. montanus* develops fewer cauline internodes than in the south. Thus, for example, in plants collected from the vicinity of the Kostroma, N.V. Zinger observed 19 internodes in most cases; plants collected from the vicinity of Moscow had 20, while individual plants from the vicinity of Kiev usually had 24, those from Novo-Alexandria (Poland) 26. This variation in the number of internodes N.V. Zinger explained by the longer or shorter duration of the vegetative period and likewise also on the development of the mountain rattlesnake. The range of *R. montanus* is great (see above), reaching in the east up to the Yenisey River. Whether it is distributed in Eastern Siberia (in particular, the Baikal Region) and in Mongolia, is not yet clear. The available collections from these regions being comprised of a typical, deviant specimens, this question, therefore, needs to be resolved on the basis of further material.

2. *R. aestivalis* (Zing.) B. Schischk. and Serg. in Fl. Zap. Sib. X (1939) 2531.—*R. major* ssp. *aestivalis* Soó in Fedde, Repert. sp. nov. XXVI (1929) 200.—*Alectorolophus major* ssp. *eumajor* Stern. in Abh. zool.-bot. Gesellsch. Wien. I. 2 (1901) 72, p.p. —*A. major* ssp. *aestivalis* Zing. in Spisok rast. GRF, VIII (1922) No. 2531.—*A. aestivalis* Zing. in Tr. Tifl. bot. sada, XII, 2 (1913) 184.—*Exs.*: GRF, No. 2531.

666 Annual. Stem 20–50 cm tall, subglabrous, somewhat pilose only on nodes and lower part, often with dark longitudinal lines, usually profusely branched, with numerous internodes. Leaves oblong-lanceolate or ovate-lanceolate, 3–8 cm long, 5–15(18) mm broad, intercalary leaves 1–2(3) pairs. Inflorescence appearing near 6–10(15)th node. Bracts deltoid-ovate, lanceolate-subulate above, with acute lanceolate teeth. Calyx 10–18 mm long, glabrous, asperate along lateral sutures. Corolla light yellow, (18)19–22 mm long, with curved tube; beak of upper lip obtuse; lower lip appressed to upper, corolla throat closed. Capsule orbicular-ovate. Seeds 3–5 mm long. July to August.

Meadows, sometimes among crops.—*European USSR*: all regions (except extreme north); *Caucasus*: Ciscaucasia, *Western Siberia*: Upper Tobol, Irtysh, Altai Mountains; *Eastern Siberia*: Angara-Sayan (an escape also farther east). *General distribution*: Central Europe, North America (escape?). Described from Poland. Type in Leningrad.



3. *R. cretaceus* Vass. sp. nov. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XVII (1955).

Annual. Stem 30 cm tall, slender, sparsely pilose, pale violet, branched, with long slender branches obliquely erect and equaling main stem, rarely unbranched; internodes reduced (up to 15–20 in number). Leaves narrowly lanceolate or linear-lanceolate, linear on lateral branches, equaling internodes or often longer, crenate-denticulate, (1)1.5–2.5(3) cm long, 2.5–4.5(5) mm broad; intercalary leaves 5–7 pairs. Bracts ovate, incise-dentate, glabrous, equaling calyx. Calyx (in fruit) up to 15 mm long, glabrous, finely asperate along margin. Corolla 18–20 mm long, yellow, with appressed lower lip. Capsule 7–8 mm long, orbicular-ovate. Seeds about 2–2.5 mm long, with light, very narrow wing along margin. July to August.

Calcareous slopes. *European USSR*: Lower Don. Endemic. Described from Svyatye Mountains on Donets. Type in Leningrad.

4. *R. vernalis* (Zing.) B. Schischk. and Serg. in Fl. Zap. Sib. X (1939) 2530.—*R. major* ssp. *eumajor* Schinz and Thell. in Bull. Herb. Boiss. sér. VII (1907) 500.—*R. major* 1. *typus* Soó in Fedde, Repert. sp. nov. XXVI (1929) 199.—*R. major* Ehrh. Beitr. 6 (1791) 144, non L.; Wulff in Fl. Yugo-Vost. VI, 222.—*Alectorolophus major* ssp. *eumajor* Stern. in Oesterr. Bot. Zeitschr. XLV, 5 (1895) 161, p.p.; Abh. Zool.-bot. Gesellsch. Wien, I, 2, 72, p.p.—*A. major* ssp. *major* var. *eumajor* Hegi, Illuster. Fl. Mittel-Eur. VI, 1 (193) [sic] 108. *A. major* ssp. *vernalis* Zing. in Spisok rast. GRF, VIII (1922) No. 2530-a—*A. vernalis* Zing. in Tr. Tifl. bot. sada, XII, 2 (1913) 182.—*Ic.*: Rchb. Ic. fl. Germ. XX (1862) tab. 118 (sub *Alect. majore* Rchb.); Stern in Oesterr. Bot. Zeitschr. XLV, 667 tab. VII.—*Exs.*: GRF, No. 1529 (sub *A. major* ssp. *eumajor* Stern.); No. 2530 (sub *A. major* ssp. *vernalis* Zing.); Hayek, Fl. Stir. ex. No. 562.

Annual. Stem (10)20–40(50) cm tall, usually with dark (violet-brown) lines, sparsely pilose (mainly on nodes and in inflorescence), simple or with few long branches above; internodes elongated, often 5–9 in number. Leaves oblong-ovate or lanceolate, crenate-dentate, often 1/2 as long as internodes, 2–6 cm long, (3)5–10(15) mm broad; intercalary leaves absent or only one pair. Inflorescence appearing on 5–7th node. Bracts glabrous, broadly ovate-rhombic, tapering above, acuminate; lower teeth large (up to 5 mm long), gradually reducing toward tip. Calyx glabrous, asperate along sutures (margin), 13–15(18) mm long. Corolla light yellow, (18)20(22) mm long, with curved tube; beak of upper lip 1.5(2) mm long, violet or white (f. *albidens* Ostenf. f. *leucodon* Sém.). lower lip appressed to upper, corolla throat closed. Capsule 10–12 mm long. Seeds winged, 3.5–4.5 mm long. May to July (August).

Meadows, forest edges, as weed in fields, in Caucasus (in sub-alpine zone), reaching to 2500–2600 m.—*European USSR*: all regions; *Caucasus*: Ciscaucasia, eastern and southern Transcaucasia; *Western Siberia*: Upper Tobol, Irtysh, Ob' Region; *Eastern Siberia*: Angara-Sayan, Dauria. *General distribution*: Central and Atlantic Europe, Scandinavia, Balkan States-Asia Minor. Described from Poland. Type in Leningrad.

*Note*. Some plants are observed in the range of this species that apparently are stunted among crops, with a single-flowered stem, about 10 cm tall (f. *gracilis* Seml.). Caucasian plants of this species, according to N.A. Busch, are less pubescent and are, referred by him (in herb.) to *R. major* var. *glabra* Rchb. However, I did not see differences in the pubescence of Caucasian plants and plants from European USSR, which could serve as a basis for separating these varieties.

5. *R. ponticus* (Stern.) Vass. comb. nov.—*Alectorolophus ponticus* Stern. in Abh. zool.-bot. Gesellsch. Wien, 1, 2 (1901) 48.—*Exs.*: Balansa. pl. or. (1866).

Annual. Stem about 30 cm tall, green, subglabrous, sparsely branched above. Cauline leaves almost equaling internodes, oblong-lanceolate, with rounded base, tapering above, acuminate, with subacute, appressed teeth along margin; intercalary leaves absent. Bracts subglabrous, deltoid-rhombic, tapering above into short mucro, with subequal acute lanceolate teeth along margin. Calyx glabrous, finely asperate along teeth margin. Corolla about 20 mm long, yellow, with slightly twisted tube; beak of  
668 upper lip horizontally diverging, up to 2 mm long, violet; lower lip appressed to upper, corolla throat closed. Seeds with about 1 mm broad wing. July to August.

Reported (Sterneck, l.c.) from southern Transcaucasia. *General distribution*: Asia Minor (Lazistan). Described from Lazistan. Type in Vienna.

6. *R. pectinatus* (Behrend.) Vass. comb. nov.—*R. subulatus* (Stern.) Soó ssp. *pectinatus* (Behrend.) Soo in Fedde, Repert. sp. nov. XXVI (1929) 182.—*Alectorolophus pectinatus* Behrend. in Verh. bot. Ver. prov. Brandenburg. 45 (1904) 51.

Annual. Stem about 50 cm tall, green, subglabrous, branched, with diverging, arcuately ascending branches almost equaling main stem. Intercalary leaves several pairs. Upper cauline leaves linear-lanceolate, long acuminate, equaling or almost equaling internodes, sharply toothed, teeth regularly spaced. Bracts glabrous, ovate-deltoid, tapering above into short mucro, slightly exceeding calyx, cristate-dentate along margin, teeth narrowly subulate, acute (but, not aristate), becoming smaller toward tip. Calyx glabrous, finely asperate along margin. Corolla about 18–20 mm long,

with slightly curved tube; lower lip appressed to upper, corolla throat closed. Fruit and seeds not known. July to August (Plate XXIV, fig. 2).

Forest glades in middle mountain belt.—*European USSR*: Crimea; *Caucasus*: western and southern Transcaucasia. Endemic. Described from Armenia. Type in Berlin.

7. *R. subulatus* (Stern.) Soó in Fedde, Repert. XXVI (1929) 182.—*Alectorolophus subulatus* Stern. in Abh. zool.-bot. Gesellsch. Wien, 1, 2 (1901) 80.—*Exs.*: Herb. Fl. Cauc. No. 608.

671 Annual. Stem up to 50 cm tall, with dispersed, longitudinal, dark striations, subglabrous, with elongated internodes, usually branched in upper half, branches shorter than main stem. Cauline leaves narrowly linear, long acuminate, densely serrulate-denticulate, equaling internodes; intercalary leaves absent. Bracts glabrous, ovate-deltoid, short-pointed, cristate-partite, equaling calyx; lower teeth subulate, up to 5 mm long, aristate, upper teeth shorter, but also narrowly lanceolate-subulate. Calyx 13–15 mm long, glabrous, sparsely asperate along margin. Corolla 18–20 mm long, yellow, with suberect tube; beak of upper lip horizontally diverging, up to 1.5–2 mm long; lower lip appressed to upper, corolla throat closed. Capsule orbicular-ovate. Seeds with about 1 mm broad wing. June to July.

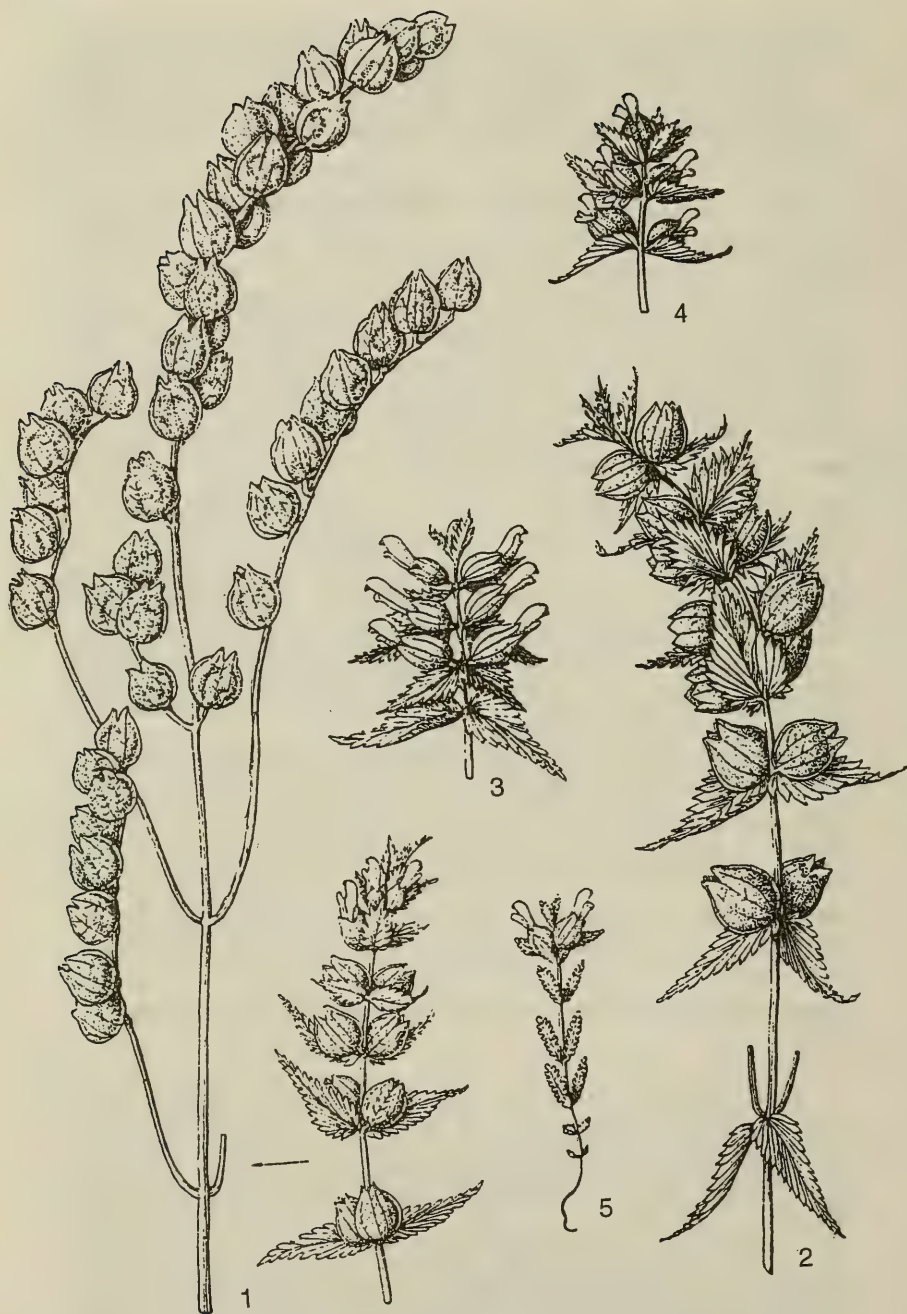
Forest glades and edges in deciduous forest zone.—*European USSR*: Crimea; *Caucasus*: all regions. Endemic. Described from Caucasus (Radde, from "Pedoun"). Type in Vienna.

*Note.* Soó (l.c.) reports a plant of the type of *R. subulatus* from Armenia, but distinguishes it from the latter by the more distinct puberulence. I was unable to see plants of similar character. So far, it has not been possible to decipher the collection sites of this plant. The description of the routes and collection sites (see: Radde, Die Sammlungen des Kaukasischen Museums, II, Botanik, 1901, and others) of the plants does not contain the names "Pedoun" (in Sterneck's text) or "Hedoun" (in Chabert's text); neither does it contain names in spelling to these two. This question can be decided only by fresh, thorough study of the labels of the authentic species.

8. *R. songaricus* (Stern.) B. Fedtsch. in Fedtsch. i Fler. Fl. Evrop. Ross. (1910) 880; Kryl. Fl. Zap. Sib. X, 2533; Soó in Fedde, Repert. sp. nov. XXVI (1929) 201.—*Alectorolophus songaricus* Stern. in Abh. zool.-bot. Gesellsch. Wien, 1, 2 (1901) 79.—*Exs.*: Herb. Soc. Nat. Cur. Mosq. No. 365.

Annual. Stem 30–60 cm tall, simple or sparsely branched; branches and leaves closely appressed to stem; stem glabrous (somewhat pilose only at nodes) or sparsely pubescent, with 8–10(15) internodes. Leaves linear-lanceolate, (2)3–6(9) cm long, very narrow on lateral branches (2–3 mm





broad), up to 7–8 mm broad on main stem, appressed to stem or obliquely erect, numerous, crowded, exceeding or at least equaling internodes; intercalary leaves absent. Bracts glabrous, deltoid-lanceolate, long acuminate, with acute teeth; lower teeth long; upper gradually reduced toward tip; lower bracts 1.5–2 times as long as calyx, upper equaling it. Inflorescence dense, flowers crowded. Calyx glabrous, asperate along margin, 15–18 mm long in fruit. Corolla (16)17(18) mm long, yellow, with slightly curved tube; beak of upper lip violet, about 1.5 mm long; lower lip appressed to upper, corolla throat closed. Capsule orbicular-ovate, (10)12–15 mm long. Seeds 3.5–4 mm long, 2.5–3 mm broad, with about 1 mm broad membranous wing. June to July.

672 Salt marsh meadows and valleys of rivers and lakes.—*European USSR*: Black Sea Region, Crimea, Lower Don, Lower Volga, Trans-Volga Region; *Caucasus*: Ciscaucasia, *Western Siberia*: Upper Tobol, Irtysh, Altai Mountains; *Soviet Central Asia*: Balkhash Region, Dzh.-Tarbagatai, Tien Shan. *General distribution*: Dzh.-Kashgar. Described from “Songaria”. Type in Vienna.

*Note*. Within the range of this species a race is found, the members of which develop, apparently, in extremely wet conditions (marshy meadows, banks of rivers, lakes etc.). These plants are distinguished from typical *R. songaricus* by a slender, always simple stem, and small (1.5–2.5 cm long, 2.5–3.5 mm broad), narrowly oblong (up to linear) leaves more distantly spaced along the stem. I assign these plants to a separate subspecies (*R. songaricus* ssp. *riparius* m.). This subspecies is distributed at the eastern limit of the range of the species: in the Trans-Baikal Region and in the mountain ranges of southern Siberia, eastern Kazakhstan and Kirgizia—up to the Transalai Range, where a plant of similar character is observed in the valley of the Muksu River and near Gulcha. It is reported also from the mountain massif of Ulutau in northern Kazakhstan.

Very interesting is the plant, collected near Temir and Aktyubinsk, on 22-7-1926, no. 76, in a dampish meadow by M.M. Ilin and M.N. Avramchik. In appearance this plant is similar to *R. songaricus*, but is distinguished from it by its more distant leaves and, importantly, by very large seeds (5–6 mm long). Unfortunately, only one specimen is available, which makes it difficult to determine the exact taxonomic status of this plant.

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Plate XXXIV.

1. *Rhinanthus ferganensis* Vass., upper portion of plant at fruiting stage, portion of inflorescence at flowering stage.—2. *R. pectinatus* (Behrend.) Vass., portion of inflorescence at fruiting stage.—3. *R. major* L., flowering portion of inflorescence.—4. *R. minor* L., flowering portion of inflorescence.—5. *R. schischkinii* Vass., general appearance of plant.

9. *R. ferganensis* Vass. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XVII (1955).

Annual. Stem 40–60(75) cm tall, thick (5–6 mm in diameter in lower part when dry), sparsely pilose on nodes, profusely branched in upper half, with long, erect, slender branches, densely leafy; internodes 15–20. Leaves numerous, lanceolate or narrowly lanceolate, small, 1–2 cm long and 2.5–3(5) mm broad on lateral branches, larger on main stem, but shedding by fruiting stage. Bracts ovate, sharply serrate-dentate, up to incised, acuminate. Calyx light colored (culmiferous), glabrous, finely asperate along margin, 10–12 mm long. Corolla yellow, 16–17 mm long, beak of upper lip darker, bluish, about 1 mm long; lower lip appressed to upper, corolla throat closed. Capsule 8 mm long and almost as broad, light brown. Seeds 3–4 mm long, winged, with light brown margin. Flowering in June. Fruiting from July (Plate XXXIV, fig. 1).

Banks of rivers, rivulets, irrigation canals.—*Soviet Central Asia*: Syr Darya. Endemic. Described from Osh. Type in Leningrad.

- 673 10. *R. apterus* (Fries) Ostenf. in Raunk. Dansk. Ekskursionfl. ed. 4 (1922) 267; Shishkin in Sorn. rast. SSSR, IV, 130.—*R. reichenbachii* (Drejer) Benth. in DC. Prodr. X (1846) 558, p.p.—*Alectorolophus apterus* Ostenf. in Bot. Arch. (1904) 83; Oesterr. Bot. Zeitschr. (1904) 204.—*A. major* var. *apterus* Fries, Nov. fl. Suec. (1842) 60; Hegi, Illustr. Fl. Mittel-Eur. VI, 108.—*A. major* ssp. *apterus* Stern. in Abh. zool.-bot. Gesellsch. in Wien, 1, 2 (1901) 72; Tsenger in Spisok rast. GRF, VIII, No. 2530a.—*A. reichenbachii* Drejer in Fl. exs. Hafn. (1838) 210, p.p.—*Id.*: Stern. in Oesterr. Bot. Zeitschr. XLV, tab. VIII.—*Exs.*: GRF, No. 2532a (sub *Alector. majore* Rchb.); Fries, Herb. norm. fasc. 10, No. 19.

Annual. Stem 20–50(60) cm tall, with 7–12 internodes, somewhat pilose, markedly pubescent on nodes, usually with numerous, dark, longitudinal lines, branched in upper half, with arcuately ascending lateral branches, upper branches slightly shorter than main stem. Leaves oblong-lanceolate, (2)3–6(7) cm long, (3)5–10(15) mm broad, exceeding or equaling internodes; intercalary leaves absent or not more than 1–2 pairs in upper part of stem, between last pair of branches and inflorescence. Bracts ovate-lanceolate, long acuminate, exceeding calyx, lower teeth larger, gradually becoming smaller toward tip. Calyx glabrous, asperate along margin. 12–18 mm long. Corolla yellow, 18–20 mm long, with slightly curved tube, beak of upper lip 1–1.5 mm long; lower lip appressed to upper, corolla throat closed. Capsule orbicular-ovate. Seeds wingless or with very narrow, indistinct margin, 2.5–3(4) mm long, similar to ear cavity in shape. July.

Weed among crops of winter cereals (mainly rye and wheat). *European USSR*: Baltic Region, Ladoga-Ilmen, Dvina-Pechora, Volga-Kama,



Upper Dniester, Upper Volga, Middle Dnieper, Volga-Don, Trans-Volga Region; *Western Siberia*: Upper Tobol, Ob' Region, Irtysh. *General distribution*: Central Europe, Scandinavia. Described from Sweden. Type in Uppsala.

*Note.* Dreier (Dreier, Fl. exs. Hafniensis, 1838) described *R. reichenbachii*, from Germany, with wingless seeds, but with a glabrous or pubescent calyx. The latter suggests that Dreier confused at least two species under this name. According to Zinger (l.c.), the well-known expert on rattleweed, A. Chabert A. Chabert, having studied material of *R. reichenbachii* identified by Dreier himself, arrived at the conclusion that even three different species are confused under this name. Later, the monographer of the genus *Rhinanthus* Sterneck (1901), assigned forms of *R. reichenbachii* with a pubescent calyx to *R. alectorolophus* ssp. *buccalis* Stern. As for forms with a glabrous calyx, their position is not clear to me. Possibly, these belong to a western race of wingless rattleweed, which should be regarded as a separate species (*R. reichenbachii*). This question can be decided not only by studying Dreier's material, but also by special study of Western European rattleweeds with wingless seeds. Hence I found it more advisable to retain the name *R. apterus* for the eastern forms of rattleweed with wingless seeds and a glabrous calyx. Moreover, this name is very suitable, revealing the basic characteristic feature of the species, and is generally used in USSR. Zinger's research ("O podvidakh bol'shogo pogremka—*Alectorolophus major* Rchb." 1928) shows that in *R. apterus*, the capsule valves do not separate on maturity, as in species growing in meadows, but remain tightly pressed together. The calyx thus being closed, the seeds do not spill out of capsule even with strong vibrations, but remain inside (or inside the closed calyx). When the plants shake, they produce a noise ("rattle"); hence, the plant is popularly called "zvonets," "bubovnik" and "pogremok," etc. Zinger suggests that similar names were initially attributed to *R. apterus*, and only later did they acquire generic significance. As a result of the confinement of the wingless rattleweed seeds within the capsule, they fell among the rye grains during harvesting and threshing, and it was difficult to completely remove them by the old, primitive method of cleaning grain. In autumn they were sown in fields along with the grains, leading to the growth of wingless rattleweed among rye crops (especially among thin crops, for example, in sandy unfertilized soils, etc.).

*Economic importance:* It is one of the "special" weeds among winter grain crops. Seeds of this species, without a circular wing, are comparatively difficult to separate from rye and wheat grains while winnowing. Thus, the development cycle of the wingless rattleweed coincides with the development of rye and wheat and it ripens simultaneously with them up to the moment of grain harvest.

11. *R. sachalinensis* Vass. sp. nov. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XVII (1955).

Annual. Stem 40–50 cm tall, simple or with few (2–4) pairs of slender, very short branches in uppermost part, subglabrous, puberulent only at nodes, with 10–12 elongated internodes, somewhat violet in color (especially in upper part). Leaves oblong-lanceolate, 3–6 cm long, 5–10 mm broad, with subobtuse serrate teeth along margin, exceeding or equaling internodes; intercalary leaves absent. Bracts ovate-lanceolate, acuminate; lower teeth projecting, deeply sinuate, short-aristate; teeth sharply reducing toward tip, bracts thus becoming serrate. Calyx glabrous, finely asperate 675 along margin, about 15 mm long. Corolla greenish yellow (when dry), 16–17 mm long, beak of upper lip violet, lower lip appressed to upper lip. Capsule about 10 mm in diameter. Seeds wingless, deltoid-cordate, 2–2.5 mm long. July.

Mountain pastures.—*Soviet Far East*: Sakhalin (southern part). Endemic. Described from Sudzuisk Range. Type in Leningrad.

Section 2. *Minores* Stern. in Oesterr. Bot. Zeitschr. XLV (1895) 298.—Corolla small (12–15 mm long); lower lip diverging, corolla throat open. Calyx glabrous.

12. *R. nigricans* Meinsh. Fl. Ingr. (1878) 259.—*R. stenophyllus* (Schur) B. Fedtsch. Fl. Evrop. Ross. (1910) 881; Maevsk. Fl. ed. 7, 657.—*R. minor* var. *stenophyllus* Schur, Enum. pl. Transs. (1866) 511; Chabert in Bull. Herb. Boiss. VII, 513.—*Alectorolophus stenophyllus* Stern. in Oesterr. Bot. Zeitschr. XLV (1895) 301; Abh. zool.-bot. Gesellsch. Wien, I, 2, 110.—*A. parviflorus* Wallr. f. *stenophyllus* Beck. Fl. Nied. Oesterr. (1895) 1067.— *Ic.*: Rchb. Ic. fl. Germ. XX, tab. 117 (sub *Alector. minor*); Stern. in Oesterr. Bot. Zeitschr. XLV, tab. XI.—*Exs.*: Fl. exs. austro-hung. No. 2613; Fries, Herb. norm. fasc. 7, No. 12; Herb. Fl. Ingr. No. 471<sup>b</sup>.

Annual. Stem 20–50 cm tall, with 8–15 internodes, sparsely pilose (especially at nodes), branched from middle, with virgate, arcuately ascending branches, rarely simple, usually somewhat dark violet, rarely green, with 2–3 pairs of intercalary leaves. Leaves linear-lanceolate, acuminate, crenate-dentate, lower leaves shedding by flowering stage. Bracts green, sometimes blackish, with rounded, sharply incise-dentate base, lanceolate-acuminate, with teeth gradually reducing toward tip. Calyx glabrous, very finely asperate along margin, 10–12 mm long, often dark colored (darkish violet). Corolla 12–15 mm long, yellow, with slightly curved or erect tube; beak of upper lip rounded, small, indistinct, white or rarely violet (f. *maculiferus* Linb.); lower lip diverging from upper, corolla throat open. Capsule orbicular-ovate. Seeds 3–4 mm long, with light wing about 0.75 mm broad. (June) July to August.

Dry valley meadows, hills, in mountains up to 1500 m.—*European USSR*: Baltic Region, Ladoga-Ilmen, Upper Dnieper, Upper Dniester; *Caucasus*: Ciscaucasia. *General distribution*: Central and Atlantic Europe, Balkan States-Asia Minor (Balkan Peninsula). Described from Leningrad Region (Oredez River). Type in Leningrad.

*Note*. This autumn species begins to blossom in the south (for example, in the Carpathian mountains) as early as June.

13. *R. angustifolius* Gmel. Fl. Bad. II (1806) 669; Soó in Fedde, 676 Repert. XXVI, 187, p.p.—*R. crista-galli*  $\alpha$ . *angustifolia montana* L. Sp. pl. (1753) 840.—*R. crista-galli*  $\beta$ . *angustifolius* Gaud. Fl. Helv. IV (1829) 109.—*Alectorolophus angustifolius* Heynh. Nomencl. bot. (1840) 28; Stern. in Oesterr. Bot. Zeitschr. XLV, 274; Abh. zool.-bot. Gesellsch. Wien, I, 2, 94.—*A. angustifolius*  $\alpha$ . *typicus* Beck, Fl. Nied. Oesterr. (1893) 1068.— *Ic.*: Stern. in Oesterr. Bot. Zeitschr. XLV, tab. XI; Rchb. Ic. fl. Germ. XX (1862) tab. 119.— *Exs.*: Schultz, Herb. norm. No. 64, 108; Hayek, El. Stir. exs. No. 192.

Annual. Stem 20–60 cm tall, often with numerous, dark longitudinal lines, subglabrous, usually profusely branched in upper half with arcuately ascending branches, with numerous reduced internodes. Leaves linear or linear-lanceolate, exceeding internodes, crenate-dentate; intercalary leaves 2–7 pairs. Bracts glabrous, narrowly deltoid, slightly exceeding calyx; lower teeth lanceolate, subulate, long aristate (arista up to 5 mm long), teeth reducing toward tip. Calyx glabrous. Corolla 12–15 mm long, with short curved tube; beak of upper lip suberect, up to 1.5(2) mm long, violet, subacute; lower lip diverging, not appressed to upper, corolla throat open. Seeds with about 1 mm broad wing. (July) August to September.

Stony and rubbly slopes and outcrops of stones and rubble.—*European USSR*: Upper Dnieper, Middle Dnieper, Black Sea Region, Bessarabia, Upper Dniester, Crimea. *General distribution*: Central Europe. Described from Baden (Germany). Type in Berlin.

14. *R. minor* L. Amoen. Ac. III (1756) 54; Ehrh. Beitr. IV (1791) 144; DC. Prodr. X, 557; Koch, Syn. II, 626; Simonkai, Enum. pl. Transs. 431; Shishkin in Fl. Zap. Sib. X, 2534.—*R. crista-galli* var. *minor* Döll, Rhein. Fl. (1843) 338.—*Alectorolophus minor* Dum. Fl. Belg. (1827) 33; Wimm. and Grab. Fl. Siles. II, 1, 213; Stern. in Oesterr. Bot. Zeitschr. XLV, 298; Abh. zool.-bot. Gesellsch. Wien, I, 2, 103.—*A. parviflorus* Wallr. Sched. crit. (1822) 318.—*A. crista-galli* M.B. Fl. taur.-cauc. II (1808) 68.— *Ic.*: Rchb. Ic. pl. VIII, fig. 974; Stern. in Oesterr. Bot. Zeitschr. XLV, tab. XI.— *Exs.*: Fl. exs. austro-hung. No. 136, 2612; Dörf. Herb. norm. No. 5149; Lindb. Pl. Finl. exs.; GRF, No. 1528.



Annual. Stem 20–50 cm tall (sometimes shorter), with few (4–9) elongated internodes (exceeding leaves), sparsely pilose or glabrous. with or without diffuse, longitudinal, dark lines (f. *maculiferus* Lindb.); lateral branches shorter than main stem. Leaves shorter than cauline internodes, lanceolate or oblong-lanceolate, 2–4 cm long, 5–10 mm broad; intercalary leaves absent. Bracts blackish green (lower bracts green, similar to cauline leaves in color), ovate-deltoid at base, long acuminate, sharply dentate  
 677 with teeth gradually reducing toward tip. Calyx glabrous, finely asperate along margin (suture), (10)12–15 mm long in fruit. Corolla yellow, 12–15 mm long, with erect tube shorter than calyx; beak of upper lip small, rounded, light or violet; lower lip distant, diverging from upper lip, corolla throat open. Capsule orbicular, 9–10 mm in diameter. Seeds 3–4 mm long, winged. May to June (August in south of areal) (Plate XXXIV, fig. 4).

Meadows, banks of rivers, lakes, sea coasts.—*European USSR*: Karelia-Lapland, Dvina-Pechora, Ladoga-Ilmen, Baltic Region, Upper Dnieper, Upper Volga, Volga-Kama, Upper Dniester, Middle Dnieper, Volga-Don, Trans-Volga Region, Black Sea Region, Bessarabia, Lower Don; *Caucasus*: Ciscaucasia, *Western Siberia*: Upper Tobol', Irtysh. *General distribution*: Central and Atlantic Europe, Scandinavia. Described from Western Europe. Type in London.

*Note*. Within the limits of this species there is var. *septentrionalis* Kihl. [in Mem. Soc. Fauna Fl. Fenn. 20 (1943–1944) 17] with an intensively pigmented (violet in color) short stem, terminally crowded flowers and 2–3 pairs of broadly lanceolate leaves. In several features (reduced inflorescence, few leaves), this variety is close to *R. groenlandicus* (Ostenf.) Chab. (see below). Further collection of material is necessary in order to explain the relation-ship of *R. minor* var. *septentrionalis* and *R. groenlandicus*. *R. minor* shows a clear tendency to spread eastward and at present it occurs, perhaps, not only in Western Siberia, but also beyond the Yenisey River. Further observations are needed.

These are plants similar to *R. minor* from the northern Caucasus in herbaria. These however, are distinguished by the presence of several shortened internodes and perhaps a brighter corolla and are late-flowering (for example, the collection of E. and N. Busch in Digoriya). This, apparently, is an autumn ("autumnalis") plant, and, possibly, should be treated as a separate species. Due to inadequate material and observations, I have left this question open for the present.

15. *R. rusticus* (Chab.) Druce in List of Brit. pl. (1908) 54.—*R. minor* var. *rusticus* Chab. in Bull. Herb. Boiss. (1899) 512.—*R. crista-galli* ssp. *rusticus* (Chab.) Soó in Fedde, Repert. XXVI (1929) 187.—*Alectorolophus rusticus* Stern. in Abh. zool.-bot. Gesellsch. Wien, I, 2 (1901) 108.

Annual. Stem slender, simple, 4–8(12) cm tall, with very short and comparatively numerous (6–9) internodes. Leaves several pairs, crowded, oblong-lanceolate or lanceolate, exceeding internodes, shedding in lower half of stem by flowering stage. Inflorescence capitate, with few (2–5) flowers crowded at stem tip. Bracts ovate, incise-dentate, with lanceolate teeth. Calyx 8–10 mm long, glabrous, with margin (sutures) covered with very minute, dense, scarios bristles, usually darkening by fruiting stage (somewhat dark violet). Corolla 12–14(15) mm long, with somewhat diverging lower lip, yellow, with very small, indistinct, dark colored small tooth on upper lip. Capsule orbicular-ovate, 8–10 mm long. Seeds 3–4 mm long, with light fringe along margin. July to August.

In alpine regions, often near snow, on glacial moraines, etc.—*Caucasus*: region of Main Caucasus Range. *General distribution*: Central Europe (Alps). Described from France. Type in Geneva.

16. *R. groenlandicus* (Ostenf.) Chab. in Bull. Herb. Boiss. (1899) 511.—*Alectorolophus groenlandicus* Ostenf. in Phan. Pterid. Faeröes (1891) 51, p.p. (excl. var.); Stern. in Abh. zool.-bot. Gesellsch. Wien, I, 2, 117.—*Exs.*: Hohenack. Pl. Labrador. No. 79, 80.

Annual. Stem fleshy, thickened, 15–35 cm tall, somewhat pilose, green, simple, very rarely with few short branches, with 4–6 elongated internodes. Leaves slightly fleshy, pilulose on both surfaces, oblong-ovate or broadly lanceolate, with large spaced teeth. Bracts sparsely pilose; ovate-deltoid at base, long tapering, exceeding calyx, incise-dentate at base, teeth reducing toward tip. Flowers crowded at stem tip in short ovate inflorescence. Calyx glabrous, finely asperate along sutures, about 15 mm long. Corolla 15 mm long, with erect tube, brownish yellow; beak of upper lip rounded, small, violet; lower lip diverging, corolla throat open. Capsule orbicular-ovate, about 10 mm in diameter. Seeds 3–3.5 mm long, with light wing along margin. July to August.

Banks of rivers, lakes, sea coasts.—*Arctic Region*: Arctic Europe; *European USSR*: Karelia-Lapland. *General distribution*: Scandinavia, Greenland, Labrador. Described from Greenland. Type in Copenhagen.

17. *R. alpinus* Baumg. Enum. stirp. Transs. II (1816) 194; Schur. Enum. pl. Transs. 512; Boiss. Fl. or, IV, 480; Simonk. Enum. Fl. Transs. 431.—*R. alpinus typus* Soó, in Fedde, Repert. XXVI (1929) 190.—*R. alpinus ssp. carpaticus* Soó, l.c.—*Alectorolophus alpinus* Stern. in Oesterr. Bot. Zeitschr. XLV (1845) 228; Abh. zool.-bot. Gesellsch. Wien, I, 2, 84.—*l.c.*: Rchb. Ic. fl. Germ. XX (1862) tab. 112; Stern. in Oesterr. Bot. Zeitschr. XLV tab. XI.—*Exs.*: Herb. Mus. Bot. Univ. Leopold. No. 4761.

Annual. Stem (10)15–20 cm tall, subglabrous, comparatively slender, dark-striated, branched in upper half, with slender, arcuately ascending branches, with numerous reduced internodes. Leaves exceeding internodes, lanceolate-linear or lanceolate, linear on lateral branches, denticulate; intercalary leaves 2–5 pairs. Flowers appearing near 10–15th node. Bracts 679 glabrous, oblong-ovate, with acute, narrowly lanceolate teeth along margin; lower bracts exceeding calyx, upper equaling it. Calyx glabrous, about 15 mm long by fruiting stage. Corolla yellow, about 15 mm long, with intensely curved tube; beak of upper lip violet, 1.5–2 mm long; lower lip 1/2 as long as upper, diverging; corolla throat open. Capsule 8(10) mm long. Seeds winged. August to September.

Mountain pastures.—*European USSR*: Upper Dniester (Carpathian Mountains). *General distribution*: Central Europe, Balkan Peninsula. Described from Transylvania. Type in Vienna.

*Note*. Soó (l.c.) differentiates in the range of this species ssp. *carpaticus* Soó, distinguished from typical *R. alpinus* by the stem, simple or with few branches. The beginning of the inflorescence is at the 6th–10th node; the inflorescence is few-flowered; intercalary leaves absent or one pair. Flowering in August.

This subspecies is observed, according to Soó, in the “Eastern Carpathians”; however, it is not yet reported from the territory of the USSR. This same author cites his new species *R. transsilvanicus* Soó (l.c. 191), distinguished from *R. alpinus* by a larger corolla (18 mm) and a lower lip appressed to the upper. This species possibly occurs in the Carpathian Mountains in the USSR.

18. *R. borealis* (Stern.) Druce in Ann. Scott. Nat. Hist. (1901) 178.—*Alectorolophus borealis* Stern. in Ann. Cons. and Jard. Genève (1899) 25; Abh. zool.-bot. Gesellsch. Wien, I, 2, 112.

Annual. Stem (8)15–30 cm tall, somewhat thickened, pilose (sometimes densely tomentose), simple with few (5–6) elongated internodes. Lower leaves oblong-ovate, upper broadly lanceolate, with large projecting teeth, pilulose. Bracts deltoid-lanceolate, tapering above (lanceolate-subulate), much exceeding calyx, with acute teeth in lower part, gradually reduced toward tip. Calyx tomentose throughout, covered with minute, multicellular hairs, 12–15 mm long. Corolla 13–15 mm long, tube erect, beak of upper lip rounded, small, lower lip diverging, corolla throat open. Capsule orbicular-ovate. Seeds winged. July (August).

Damp meadows in river valleys, along coastal regions.—*Soviet Far East*: Kamchatka (Commander Islands). *General distribution*: Aleutian Islands, Greenland, Iceland, Scotland. Described from Aleutian Islands (Unalaska). Type in Geneva.



*Note.* The species *R. arcticus* (Stern.), Vass. comb. nov., found in Alaska, is distinguished by a profusely branched stem with numerous internodes and 2–3 pairs of intercalary leaves. The cauline leaves in this species are narrower, narrowly lanceolate, the flowering is later than in *R. borealis*, namely, in August. *R. arcticus* is an autumn species (in contrast with the summer species *R. borealis*). Possibly, it occurs in USSR.

Section 3. *Hirsuti* (Soó) Vass.—Sect. *Cleistolemi* subsect. *Hirsuti* Soó in Fedde, Repert. XXV (1929) 192.—Calyx covered with long, fine multicellular hairs. Corolla large (about 20–22 mm long), upper lip appressed to lower, corolla throat closed.

19. *R. major* L. Amoen. Ac. III (1756) 53.—*R. alectorolophus* (Scop.) Poll. Hist. nat. Palat. II (1777) 177; Gmel. Fl. Bad. II, 668; Koch, Syn. fl. germ. II, 626; *R. alectorolophus* (Scop.) Pall. grex *medius* 1. *typus* Soó in Fedde, Repert. XXVI (1929) 192.—*R. hirsutus* (All.) Greml. Exsc. Fl. Schweiz (1843) 314.—*R. villosus* Pers. Syn. pl. II (1807) 151.—*Alectorolophus alectorolophus* Stern. in Oesterr. Bot. Zeitschr. XLV (1895) 11; Abh. zool.-bot. Gesellsch. Wien, I, 2, 28.—*A. hirsutus* All. Fl. Pedem. I (1785) 58; Beck. Fl. Nied.-Oesterr. II, 2, 1068.—*A. grandiflorus*  $\beta$ . *pubens* Wallr. Sched. crit. (1822) 316.—*Mimulus alectorolophus* Scop. Fl. Carn. I (1772) 435.—*Idem*: Rchb. lc. fl. Germ. XX, tab. 118; Stern. (1895) tab. IV; Maevsk. Fl. ed. 7, fig. 270; Billot, Fl. gall. and germ. exs. No. 1289 bis.

Annual. Stem 30–50 cm tall, green or with diffuse, purple (up to black), longitudinal lines, somewhat pilose (especially in upper part), simple or branched, branches usually exceeding main stem; internodes few, elongated. Lower leaves oblong-ovate, upper narrower, lanceolate, crenate-dentate, shorter than internodes; intercalary leaves absent or one pair. Inflorescence appearing usually at 5–6th node. Bracts deltoid-rhombic, pilose, acute, equaling calyx, with short and broad, lanceolate, subequal teeth. Calyx large, covered with long, fine, multicellular, white eglandular hairs; hairs smaller on teeth, unicellular. Corolla about 2 cm long, tube slightly curved; beak of upper lip horizontal, up to 2 mm long, violet, rarely white (f. *leucodon* Döll.), lower lip appressed to upper, corolla throat closed. Seeds with about 1 mm broad wing. June to July (Plate XXXIV, fig. 3).

Meadows.—*European USSR*: Upper Dnieper, Upper Dniester, Baltic Region. *General distribution*: Central Europe. Described from Western Europe. Type in London.

20. *R. patulus* (Stern.) Thell. and Schinz in Bull. Herb. Boiss. XXXIV (1907) 501.—*R. alectorolophus*  $\gamma$ . *patulus* Chab. in Bull. Herb. Boiss. VII (1899) 504.—*R. alectorolophus* ssp. *patulus* Soó in Fedde, Repert. sp.

681 nov. XXVI (1929) 194.—*Alectorolophus patulus* Stern. in Oesterr. Bot. Zeitschr. (1897) 433; Abh. zool.-bot. Gesellsch. I, 2, 34.

Annual. Stem 20–60 cm tall, sparsely pilose, green, profusely branched, with diverging, arcuately ascending branches, sometimes exceeding main stem (f. *longiramosus* Seml.); internodes numerous, reduced. Leaves oblong-lanceolate, crenate-dentate, exceeding internodes; intercalary leaves 3–7 pairs. Inflorescence appearing at 12–18th node. Bracts pilose broadly deltoid-rhombic, equaling calyx, bract teeth broadly lanceolate, subequal. Calyx covered with long, white, multicellular hairs. Corolla about 2 cm long, yellow; beak of upper lip up to 2 mm long, violet or light (f. *leucodon* Seml.); lower lip appressed to upper, corolla throat closed. Capsule 1 cm in diameter. Seeds with about 1 mm broad wing. August to September.

Meadows, grassy slopes.—*European USSR*: Upper Dniester, Upper Dnieper, Baltic Region. *General distribution*: Central Europe. Described from Austria. Type in Vienna.

*Note*. A variety with broadly ovate leaves is reported under this species; some authors consider it as independent species [*R. ellipticus* (Hausskn.) Sch. and Thell. in Bull. Herb. Boiss. (1914) 314], established already in 1894 by Haussknecht as *Alectorolophus ellipticus* Hausskn. [in Tagebl. Verz. Naturf. (1864) 368]. There is no proof of occurrence of a plant of similar character in the USSR.

21. *R. colchicus* Vass. sp. nov. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XVII (1955).

Annual. Stem 30–60 cm tall, green or somewhat violet, but without longitudinal dark lines, diffusely pilulose, branched in upper half, with long, obliquely erect branches, upper branches almost equaling main stem; internodes short, numerous (15–30), shorter than leaves. Leaves oblong-lanceolate, with minute, subobtusate, semiappressed teeth along margin, narrower on lateral branches, linear-lanceolate; intercalary leaves (4)5–7(9) pairs. Bracts with ovate base, incise-dentate (teeth acute), short-aristate, with teeth reducing toward tip, pilulose. Calyx 13–15 mm long, covered throughout with multicellular hairs. Corolla 20–22 mm long, beak of upper lip about 1.25–1.5 mm long; lower lip appressed to upper, corolla throat closed. Capsule 8 mm long, suborbicular. Seeds about 3–4 mm long, winged. August to September.

Mountain slopes (limestone) in forest zone. — *Caucasus*: western and southern Transcaucasia, Ciscaucasia foothills (west). Endemic. Described from Gagry. Type in Leningrad.

682 *Note*. This species can be compared with *R. mediterraneus* Soó (in its typical form), from which it is distinguished by features characteristic of

autumn species, while *R. mediterraneus* is a summer species. *R. colchicus* is closer to *R. arvensis* Chab., also an autumn species known from the Balkan Peninsula. However, the latter has a shorter stem (20–30 cm) with longitudinal dark lines, fewer intercalary leaves (2 pairs), and cauline leaves with acute, distantly spaced teeth.

22. *R. mediterraneus* (Stern.) Adamovic in Rad. Jugosl. Acad. CXCX (1931) 62; Soó in Fedde, Repert. XXV, 204.—*R. crista-galli* var. *mediterraneus* Fiori, Fl. analit. d'Italia, II (1926) 370.—*Alectorolophus goniotrichus* Stern. in Oesterr. Bot. Zeitschr. XLV (1895) 127, p.p.—*A. mediterraneus* Stern. in Abh. zool.-bot. Gesellsch. Wien, I, 2 (1901) 54.—*Exs.*: Aucher-Eloy, Pl. or. No. 5101.

Annual. Stem 20–40 cm tall, simple or branched, with longitudinal dark lines, somewhat pilose, with elongated internodes. Lower leaves oblong-ovate, upper lanceolate, usually shorter than internodes, with subacute teeth; intercalary leaves absent or one pair. Bracts ovate-deltoid, tapering above, pilulose, usually exceeding calyx, lower two teeth longer (up to 6–8 mm long), aristate, teeth gradually reducing toward tip. Calyx covered throughout with minute unicellular, simple hairs. Corolla about 20 mm long, tube slightly decurved, beak of upper lip conical, up to 2 mm long, violet; lower lip appressed to upper, corolla throat closed. Capsule orbicular-ovate. Seeds winged. May to July.

Mountain (limestone) slopes.—*European USSR*: Crimea; *Caucasus*: western and southern Transcaucasia, Dagestan (?). *General distribution*: Mediterranean Region, Central and Atlantic Europe, Balkan States-Asia Minor. Described from Western Europe. Type in Vienna.

*Note*. It is possible that this western species is replaced in the Caucasus by another species, noted by Soó [see Repert. XXVI (1929) 187 in adnot.], namely, *R. handel-mazzettianus* ssp. *armeniacus* Soó. This question is difficult to resolve, since I did not see specimens referred to *R. handel-mazzettianus* and Soó (l.c) did not give a diagnosis of this species, from which some idea about the latter could be formed. Determination of the character of the calyx pubescence in *R. handel-mazzettianus* ssp. *armeniacus* is especially important. Soó himself synonymized the latter with *R. mediterraneus*, but with a question mark (?).

Section 4. *Schischkiniella* Vass. sect. nov.—Calyx pubescent with minute multicellular simple hairs. Corolla 12–15 mm long with diverging lower lip.

683 23. *R. schischkini* Vass. sp. nov. in Bot. mat. Gerb. Bot. inst. Akad. Nauk SSSR, XVII (1955).



Annual. Stem 5–10(12) cm tall, somewhat pilose, with fine, longitudinal, dark violet lines; internodes 3–5, comparatively long. Leaves oblong-lanceolate, pilulose, 1–2(2.5) cm long, 5–8(10) mm broad, 3–5 pairs; intercalary leaves absent. Bracts ovate, with few large teeth, exceeding calyx. Calyx covered throughout with minute, multicellular, scattered hairs, 8(10)–12 mm long. Corolla 12–15 mm long, yellow, with slightly curved tube, beak of upper lip very small, scarcely discernible, violet; lower lip diverging, corolla throat closed. Capsule orbicular-ovate, 8–10 mm long. Seeds winged, July to August (Plate XXXIV, fig. 5).

Alpine meadows, usually near glaciers.—Caucasus: alpine region of central part of Main Caucasian Range (vicinity of Elbrus and Kazbek.) Endemic. Described from Kel-Bash (Sary-Bash) Lake. Type in Leningrad.

Section 5. *Glandulosi* (Soó) Vass.—Sect. *Cleistolemi* subsect. *Glandulosi* Soó in Fedde Repert. XXVI (1929) 197.—Calyx glandular-pubescent. Corolla large (18–20 mm long), lower lip appressed to upper, corolla throat closed.

24. *R. rumelicus* Velen. in Sitzungsber. Böhm. Gesellsch. Wiss. (1887) 455.—*R. major* var. *glandulosus* Simk. Enum. pl. Transs. (1886) 432.—*R. major*  $\beta$ . *hirsutus* Velen. Fl. bulg. (1891) 433.—*R. rumelicus* Velen. typus Soó in Fedde, Repert. sp. nov. XXVI (1929) 197.—*Alectorolophus glandulosus* Stern. in Oesterr. Bot. Zeitschr. XLV (1895) 38; Abh. zool.-bot. Gesellsch. Wien, I, 2, 43.—*lc.*: Velen. l.c. f. 20; Stern. in Oesterr. Bot. Zeitschr. XLV, tab. VI.—*Exs.*: Dörf. Herb. norm. No. 2971; Fl. exs. austro-hung. No. 2605.

Annual. Stem up to 50–60 cm tall, simple or branched, usually somewhat glandular-hairy in upper part, often with dark striations, with few elongated internodes. Cauline leaves lanceolate or oblong-lanceolate; intercalary leaves absent. Inflorescence appearing at 5–8(10)th node. Bracts glandular-hairy, ovate-deltoid, teeth short, broadly lanceolate, subequal. Calyx glandular-pubescent. Corolla about 20 mm long, tube slightly curved, tooth of upper lip horizontally diverging, about 1.5–2 mm long, violet; lower lip appressed to upper, corolla throat closed. Capsule orbicular-ovate. Seeds winged. May to June.

In meadows.—*European USSR*: Upper Dniester (?). *General distribution*: Balkan States-Asia Minor. Described from Bulgaria. Type in Vienna.

684 *Note.* *R. rumelicus* Velen. is reported for the eastern Carpathians and its occurrence in USSR is very likely. It is a spring summer species, corresponding with the autumn species *R. abbreviatus* (Murb.) Schwarz (in Mitt. Thur. Bot. Ver. (1927) 19 (*R. rumelicus* ssp. *abbreviatus* (Murb. Soó l.c.) with a profusely branched stem, numerous reduced

internodes, 2–5 pairs of intercalary leaves and other features of late (August–September) flowering species. An intermediate position between these two species is occupied by *R. rumelicus* ssp. *simonkaianus* Soó (l.c.), with a profusely branched stem with numerous reduced internodes and the absence of intercalary leaves (sometimes one pair present) and intermediate flowering times (June–July). Exposed forms of *R. rumelicus* have a glandular pubescent calyx, sometimes subglabrous on the surface and densely glandular only along sutures. These forms are related to *R. wagneri* Deg. [in Oesterr. Bot. Zeitschr. (1894) 39]. No information is available about the occurrence of these species and subspecies in the USSR.

25. *R. ösilensis* (Ronn. and Saars.) Vass. comb. nov.—*R. rumelicus* Velen. ssp. *ösilensis* Ronn. and Saars. in Fedde, Repert. XXV (1934) 97.

Annual. Stem 20–50 cm tall, with dark violet longitudinal lines, pubescent (especially in upper part) with long, multicellular, glandular hairs, branched in upper part; internodes numerous, shorter than leaves in lower part of stem and equaling or exceeding them in upper part. Cauline leaves very narrow, linear, 2(3)–4(5) mm broad, glandular-hairy on both surfaces, covered with short bristles along margin and above along midrib; intercalary leaves usually 1–3(4) pairs. Bracts 8–10 mm broad, pubescent with glandular and simple bristles, unequally dentate, teeth 2 times as long as broad, often tapering into short arista. Inflorescence appearing at 16–20th (rarely at 12–15th or 21–24th) node. Calyx covered throughout with glandular hairs and also bristles along margin. Corolla densely glandular, 18–20 mm long. Capsule glandular-pubescent. Seeds winged. August.

In marshes (in associations of *Pinguicula alpina* + *Schoenus ferrugineus*). *European USSR*: Baltic Region (Sarema-Esel islands). Endemic. Described from Sarema Island. Type in Vienna.

#### Hybrid Species

*R. × fallax* (Wimm. and Grab.) Chal. in Bull. Herb. Boiss. (1899) 514.—*Alectorolophus minor* var. *fallax* Wimm. and Grab. Fl. Siles. II, 1 (1829) 213.—*A. fallax* Stern. in Oesterr. Bot. Zeitschr. XLV (1895) 299; 685 Abh. zool.-bot. Cesellsch. Wien, I, 2, 122.—*Exs.*: GRF, No. 2534.

Annual. Refers to hybrids of *R. minor* × *R. vernalis* (*R. major*), distinguished from *R. major* by the larger corolla the up to 1 mm long tooth of the upper lip, and always violet color; from *R. vernalis* by the erect corolla tube, diverging lower lip, and shorter tooth of the upper lip. N.V. Zinger has noted on the label of this specimen that it “occurs only in places where *A. major* Rchb. and *A. minor* Wimm. and Grab. grow together in large numbers, of which it is obviously a hybrid. In the living condition, it is

easily distinguished from both these species. In dried specimens, however, differences from *A. minor* are not clearly discernible". *A. fallax* is described from Silesia. Type in Berlin.

*R. × pseudosongoricus* Vass. hybr. nov.—*R. major* var. *festissovianus* Chab. in sched.

Annual. This species was annotated by Chabert as a variety of *R. major*. However, in several features (long bracts exceeding calyx, acuminate leaves) it is close to *R. songoricus* (Stern.) B. Fedtsch. Apparently, in this case we have the hybrid type of *R. vernalis* (= *R. major* auct. non L.) × *R. songoricus*, found in the region of overlap of these species. Flowering from June to July.

Valleys of rivers and lakes.—*Western Siberia*: Irtysh, Altai Mountains; *Eastern Siberia*: Angara-Sayan, Dauria; *Soviet Central Asia*: Dzh.-Tarbagatai, Balkhash Region. Tien Shan, Pamiro-Alai (east). *General distribution*: Dzh.-Kashgar (Kuldzhinsky Oasis). Described from Kuldzha. Type in Leningrad.

*R. × pseudomontanus* V. Krecz. in sched.

Annual. In several features (narrow leaves, more internodes, corolla smaller than in *R. major*), it is close to *R. montanus*; otherwise similar to *R. major*. Flowering in June.

Known from Surazh (near Chernigov). Apparently, it is the hybrid *R. vernalis* × *R. montanus*. Type in Leningrad.

*R. × hungaricus* (Borb.) Soó in Fedde, Repert. XXVI (1929) 203.—*Fistularia hungarica* Borb. in Deutsch. Bot. Monatsschr. (1901) 147.

Annual. This species is known from Transylvania and Bosnia. Soó does not give a description and only points out that it is the hybrid *R. rumelicus* × *R. crista-galli*.

Possibly, this hybrid occurs in the USSR in the Carpathians.

## Genus 1360. *RHYNCHOCORYS*<sup>1, 2</sup> Griseb.

Griseb. Spicil. fl. Rum. and Bith. II (1844) 12 (nom. conservandum).—*Rhinanthus* L. sp. pl. (1753) 603, pro min. parte; Wettst. in Pflanzenfam. IV, 3b, 106.—*Elephas* Adans. Fam. II (1763) 211.—*Probosciphora* Neck.

Elem. I (1790) 336.—*Elephantina* Bertol. Fl. Ital. VI (1844) 279.

Calyx laterally compressed, bilabiate, upper lip bidentate, lower bipartite. Corolla with short tube and bilabiate limb, upper lip tapering into long, curved, ascending or erect beak, lower lip 3-lobed. Stamens 4, didynamous, with short filaments; anthers transversally or obliquely connivent,

<sup>1</sup> Treatment by B. K. Schischkin.

<sup>2</sup> From the Greek *rhynchos*—beak, and *korys*—helmet.



with obtuse (at tip) lobes. Stigma capitate. Capsule orbicular, loculicidal. Seeds longitudinally sulcate. Annual or perennial herbs with opposite leaves and yellow axillary flowers.

This genus includes 4 species distributed from Italy and Sicily to Iran.

1. Upper lip strongly arcuately curved ..... 1. *R. orientalis* (L.) Benth.  
+ Upper lip ascending or erect ..... 2. *R. elephas* (L.) Griseb.

1. *R. orientalis* (L.) Benth. in DC. Prodr. X (1846) 559; Ldb. Fl. Ross. III, 267; Boiss. Fl. or. IV, 478; Schmalh. Fl. II, 289; Grossh. Fl. Kavk. III, 404.—*Rhinanthus orientalis* L. Sp. pl. (1753) 603.—*Elephas orientalis* Guss. Fl. Sic. Prodr. II (1828) 155 in observ.—*E. incurva* G. Don, Syst. IV (1838) 619.—*Ic.*: Rchb. Ic. pl. crit. VIII, tab. 730.

Annual. Root shortly fibrous. Stem erect or ascending, simple or with opposite branches, pubescent, 20–60 cm tall. Leaves opposite, deltoid-ovate, subfalcate at base, subsessile, subacute, cristate-crenate, 1–2 cm long, 1–1.5 cm broad, upper (floral) leaves gradually reduced. Flowers axillary, solitary, pedicels in fruit recurved, shorter than leaves. Upper calyx lip slightly broader than lower, with obtuse lobes. Corolla yellow, upper lip with two short lateral lobes at base, transforming into subulate, elongated, extremely curved beak with small, rounded, spreading lamella at tip with ciliate margin; lower lip pubescent outside, ciliate along margin, large, orbicular-ovate, with 3 obtuse lobes; middle lobe sinuate with mucro in middle of sinus. Capsule orbicular, slightly compressed, pubescent, 10–12-seeded; seeds oblong, deeply sulcate-rugose. June to August.

In forests, among scrub, damp meadows and weedy places.—*Caucasus*: Ciscaucasia, western, eastern and southern Transcaucasia. Endemic. Described from the "Orient". Type in London.

2. *R. elephas* (L.) Griseb. Spicil. fl. Rum. and Bith. II (1844) 12; Ldb. Fl. Ross. III, 167; Boiss. Fl. or. IV, 478; Grossh. Fl. Kavk. III, 404.—*R. strictus* C. Koch ex Grossh. Opred. rast. Kavk. (1949) 320.—*Rhinanthus elephas* L. Sp. pl. (1753) 603.—*R. elephas* (L.) Griseb. var. *erecta* Boiss. l.c.—*R. strictus* C. Koch in Linnaea, XXII (1849) 684.—*Elephas recta* G. Don, Syst. IV (1838) 619.—*E. columnae* Guss. Fl. Syc. Synops. II (1844) 153.—*Ic.*: Fiori and Paol. Ic. Fl. Ital. 356.—*Exs.*: Fl. Cauc. exs. No. 295.

Annual. Plant glandular-pubescent throughout or subglabrous. Stem erect or ascending, branched, 20–40 cm tall. Leaves with very short petioles, ovate, obtuse, cristate-crenate along margin, rounded or subcordate at base, 2–5 cm long, 1–2.5 cm broad; floral leaves markedly reduced, elliptical, with acute teeth. Flowers single in leaf axils, or leaf-opposed, on short peduncles. Calyx lips dissimilar, lower lip longer and more deeply

incised. Corolla yellow, upper lip linear, abruptly curved below middle and transforming into subulate, erect or ascending beak with two teeth above base; lower lip large, equaling or exceeding upper, orbicular, with 3 obtuse lobes. Capsule globose, pilulose, shorter than calyx. Seeds numerous, subglobose, with linear stripes. June to July.

In forests, in meadows up to alpine zone.—*Caucasus*: western and eastern Transcaucasia, Talysh. *General distribution*: Sicily, Italy, Balkan States-Asia Minor. Described from Italy. Type in London.

### Genus 1361. *PEDICULARIS*<sup>1, 2</sup> L.

L. Sp. pl. (1753) 607.

Calyx campanulate or tubular, sometimes (especially in fruit) somewhat inflated, membranous, coriaceous or herbaceous with unbranched or branched veins, sometimes reticulate, often cleft in front and at the back, with 2–5 equal or unequal teeth (posterior tooth reduced or even absent) lateral, often connate. Corolla irregular, bilabiate, with long, sometimes very long (up to 10 cm) tube; tube narrow or broadened at throat, erect, curved or appearing broken; upper lip (galea) erect or often somewhat  
688 strongly curved, tapering above into short or somewhat long beak, beak sometimes exceeding galea or absent; lower lip 3-lobed, abruptly broadened from throat or clawed, with longitudinal, parallel, elevated lines. Stamens 4, didynamous, ascending under galea, anther locules parallel. Style with capitate stigma. Capsule compressed, somewhat asymmetrical, with unilateral dehiscence, or somewhat symmetrical, with apical, bilateral dehiscence. Seeds ovate or oblong, somewhat pitted or ribbed. Annual or perennial mesophytic (marsh, forest, meadow, steppe or dry steppe) herbs, with alternate or whorled (and opposite) leaves.

*Note.* The genus *Pedicularis*, consisting so far of over 400 species, falls into several natural groups, the large majority of which were known to Maksimovich, the first important monographer of this genus, who suggested naming them as series. These groups, however, are difficult to classify further, and prominent taxonomists, monographers of this genus, such as Steven, Bunge, Maximowicz, Prain, and even Bonati and Limpricht, could not entirely cope with this task. We have chosen with slight changes the earlier system of Bunge, similar in the main to the other systems. Unfortunately, research of Li (Proc. Acad. Nat. Sc. Philad. No. 100 (1949), (1948); 101 (1949) initiated on Chinese representatives of the genus, was not known to me. I cannot, therefore, assess her contribution to the taxonomy of *Pedicularis*.

<sup>1</sup> Treatment by, A.I. Vvedensky.

<sup>2</sup> From the Latin *pediculus*—louse.

Special collections are necessary for further successful study of the louse-worts in order to explain the relationship and origin of the groups, as also to differentiate the closely related species. Herbaria, as a rule, lack specimens with well represented roots, but the root system undoubtedly reveals important taxonomical features. The manner of dehiscence of the capsules and the consistency of their valves also are important taxonomic features, but fruiting specimens also are usually ignored by collectors. Finally, the color of the corolla in most cases is impossible to study from herbarium materials. This should be noted without fail in collections, without omitting even the details of the color pattern (lip, galea, beak). In order to simplify study of bract shape, it is necessary, besides whole samples, to dry several cut inflorescences, by separating parts of flowers and bracts.

1. Annuals and biennials ..... 2.
- + Perennials ..... 13.
- 689 2. Galea with two obtuse, broad, usually recurved teeth above throat; some species, in addition, with two small, erect or projecting teeth in some species ..... 3.
- + Galea without teeth above throat; teeth under tip of galea, if present, recurved ..... 8.
3. Galea beaked with two slender teeth ..... 82. *P. adunca* M.B.
- + Galea without beak or almost so, without teeth under tip, or teeth erect ..... 4.
4. Lower floral leaves larger than cauline leaves ..... 5.
- + Lower floral leaves smaller than cauline leaves ..... 6.
5. Lip ciliate, equaling galea; corolla 13–15 mm long; filaments of two stamens pilose; capsule 8–10 mm long ... 87. *P. pennellii* Hulten.
- + Lip glabrous, slightly shorter than galea; corolla 11–12 mm long; stamens with glabrous filaments; capsule 6–8 mm long ..... 86. *P. hyperborea* Vved.
6. Corolla 10–11 mm long; galea almost without beak; lip glabrous, much shorter than galea; stamens with glabrous filaments ..... 85. *P. vlassoviana* Stev.
- + Corolla 14–22 mm long; galea subrostrate, with minute, erect teeth under tip; lip ciliate, slightly shorter than or exceeding galea .... 7.
7. Corolla 14–16 mm long, capsule 7–10 mm long 84. *P. karoï* Freyn.
- + Corolla (18)20–22 mm long; capsule 13–16 mm long ..... 83. *P. palustris* L.
8. Leaves whorled; galea without teeth under tip ..... 9.
- + Leaves alternate; galea with two teeth under tip ..... 12.
9. Leaves sinuate-pinnatifid or deeply pinnately lobed with crenate-serrate segments; corolla bright purple, 12–15 mm long; lip almost 2 times as long as galea ..... 35. *P. spicata* Pall.



- + Leaves pinnatisect, with pinnately lobed or deeply pinnati partite segments; corolla light yellow, sometimes with reddish veins, 15–28 mm long; lip equaling or slightly shorter than galea ..... 10.
- 10. Galea somewhat curved at tip and gradually transformed into distinct beak; corolla bent in calyx throat; leaf segments deeply pinnatipartite ..... 32. *P. myriophylla* Pall.
- + Galea almost without beak or with projecting beak; corolla much exceeding calyx throat, curved; leaf segments pinnately lobed . 11.
- 690 11. Galea with distinct beak; filaments of two stamens pilose ..... 33. *P. ludwigii* Rgl.
- + Galea almost without beak; stamens with glabrous filaments ..... 34. *P. abrotanifolia* M.B.
- 12. Plant crispate-pubescent; flowers yellow, later sometimes coated with anthocyanin; capsule sublinear, horizontally diverging ..... 41. *P. labradorica* Wirsing.
- + Plant glabrous; flowers pink; capsule obliquely broadly oblong ... 81. *P. sylvatica* L.
- 13. Rootstock, slender, creeping ..... 14.
- + Plant without rootstock or with thick reduced rootstock ..... 17.
- 14. Leaves opposite; flowers singly in axils of upper leaves, not forming separate inflorescence ..... 36. *P. kuznetzovii* Kom.
- + Leaves alternate; flowers in terminal inflorescence ..... 15.
- 15. Galea without beak; lip parallel to galea . 103. *P. capitata* Adams.
- + Galea with distinct beak; lip diverging from galea ..... 16.
- 16. Cauline leaves glabrous, short-petiolate; corolla yellowish, 14–15 mm long; capsule linear-lanceolate, horizontally diverging or slightly recurved ..... 37. *P. lapponica* L.
- + Cauline leaves long crispate-hairy, sessile, semi-amplexicaul; corolla yellow, 30–32 mm long; capsule oblong ..... 38. *P. tristis* L.
- 17. Galea without beak, villous-ciliate in front along margin ..... 18.
- + Galea glabrous in front along margin, with long beak if villous 19.
- 18. Leaves deeply pinnatipartite into broadly ovate lobes; calyx lobes dentate ..... 104. *P. spectrum-carolinum* L.
- + Leaves tripinnatisect into linear lobules; calyx teeth entire ..... 105. *P. grandiflora* Fisch.
- 19. Leaves (and bracts) whorled (or lower opposite). Plant sometimes acaulescent ..... 20.
- + Leaves distinctly alternate; plant always with distinct stem, even if sometimes short ..... 47.
- 20. Galea with long beak; beak as long as galea, curved along with it; galea with two obtuse teeth above throat 4. *P. tianschanica* Rupr.
- + Galea without beak or with long beak, but always much shorter than galea: galea without teeth above throat ..... 21.

- 691 21. Corolla tube included in calyx throat, i.e. bent at right or obtuse angle much below middle ..... 22.  
 + Corolla tube erect or smoothly falcate or sharply curved, but from middle or above ..... 30.
22. Lip exceeding, equaling or slightly shorter than galea ..... 23.  
 + Lip 2/3 as long as galea ..... 29.
23. Leaf segments broadly oblong or suborbicular, coarsely dentate, with distinctly chondroid margin; anthers usually spaced in pairs ..... 17. *P. verticillata* L.  
 + Leaf segments sublinear, linear-lanceolate, lanceolate, deltoid-oblong or deltoid-lanceolate or, at least, obversely oblong or obversely oblong-lanceolate and patently dentate, but never with distinctly chondroid margin, only with chondroid-pointed teeth; anthers always connate ..... 24.
24. Leaf segments deltoid-oblong or deltoid-lanceolate, decurrent on winged dentate axis ..... 22. *P. amoeniflora* Vved.  
 + Leaf segments different in shape; axis not dentate ..... 25.
25. Leaf segments obversely oblong or oblanceolate, patently dentate ..... 10. *P. eriophora* Turcz.  
 + Leaf segments sublinear, linear-lanceolate or lanceolate, with projecting teeth ..... 26.
26. Lip 1.5–2 times as long as galea ..... 27.  
 + Lip equaling galea or slightly longer ..... 28.
27. Leaf segments coarsely dentate, with recurrent-denticulate teeth; whorls of cauline leaves 2–4 ..... 7. *P. macrochila* Vved.  
 + Leaf segments with sharp-toothed lobes, whorls of cauline leaves 1–2 ..... 11. *P. amoena* Adams.
28. Root fibers fusiform; leaf segments sharply pinnatipartite ..... 9. *P. korolkovii* Rgl.  
 + Root fibers funiform; leaf segments serrulate or subentire ..... 8. *P. arguteserrata* Vved.
29. Galea without beak; corolla pinkish violet ..... 12. *P. violascens* Schrenk.  
 + Galea with distinct, but short conical beak; corolla variegated ..... 16. *P. cheilanthifolia* Schrenk.
30. Galea with two acute teeth below tip, teeth narrowly deltoid, recurved, or projecting and recurved; plant acaulescent or with short weak stem ..... 31.
- 692 + Galea without teeth below tip or with teeth, but in latter case stems well developed, stout ..... 34.
31. Galea smoothly curved at tip; teeth under it projecting or recurved ..... 32.

- + Galea hooked at tip, teeth under it recurved ..... 33.
- 32. Corolla pale pink, with pinkish purple lip, 28–32 mm long, stem short, but distinct ..... 29. *P. karatavica* Pavl.
- + Corolla white, 30–45 mm long; plant acaulescent or almost so ....  
..... 30. *P. waldheimii* Bonati.
- 33. Corolla yellowish, with purple tinged lip 25. *P. zeravschanica* Rgl.
- + Corolla pinkish yellow, monochromatic, plain .....  
..... 26. *P. inconspicua* Vved.
- 34. Capsule symmetrical or almost so ..... 35.
- + Capsule distinctly asymmetrical, i.e. beak deflected to one side, making it easier to distinguish ventral and dorsal sides of capsule... 40.
- 35. Stems stout, distinctly 4-angled in inflorescence and under it, pubescent, sometimes crispate-hairy in inflorescence; galea slightly shorter than tube ..... 36.
- + Stems glabrous or somewhat densely pubescent with long crispate hairs, short hairs absent; plant sometimes acaulescent ..... 37.
- 36. Galea with very short beak, 1.5 times as long as lip .....  
..... 18. *P. interrupta* Steph.
- + Galea with beak nearly as long as width of galea, galea 2 times as long as lip ..... 19. *P. platyrrhyncha* Schrenk.
- 37. Stem distinct, well developed, floral leaves present ..... 38.
- + Plants subacaulescent; floral leaves absent ..... 39.
- 38. Galea without beak ..... 20. *P. pycnantha* Boiss.
- + Galea with rudimentary beak ..... 21. *P. olgae* Rgl.
- 39. Corolla white or pinkish violet, galea obtusely bidentate at tip ....  
..... 23. *P. pulchra* Pauls.
- + Corolla yellow, beak and teeth absent ..... 24. *P. verae* Vved.
- 40. Stems well developed, erect or ascending at base, glabrous or with 2–4 hairy lines ..... 41.
- + Stems weak, partially ascending, somewhat densely pubescent with long crispate hairs, or plants acaulescent ..... 45.
- 41. Galea with long beak ..... 42.
- 693 + Galea without or with rudimentary beak ..... 43.
- 42. Stem and leaves glabrous; lip ciliate; capsule obliquely oblong, almost semicircular ..... 5. *P. chamissonis* Stev.
- + Stem and leaf petioles pubescent; lip glabrous; capsule obliquely lanceolate or obliquely oblong-lanceolate .....  
..... 6. *P. crassirostris* Bge.
- 43. Corolla tube bent at right angle above or near middle; galea with rudimentary beak or truncate at tip ..... 44.
- + Corolla tube smoothly falcate; galea rounded at tip in front .....  
..... 15. *P. caucasica* M.B.
- 44. Galea with rudimentary beak ..... 13. *P. subrostrata* C.A.M.



- + Galea without beak at tip, truncate ..... 14. *P. pontica* Boiss.
45. Corolla white, 30–35 mm long; plant subcaulescent, but often with long, ascending branches ..... 31. *P. maximowiczii* Krassn.
- + Corolla pinkish purple or at least lip pinkish purple; stem simple 46.
46. Radical leaves absent; galea equaling lip or slightly shorter; corolla pinkish purple or white, with pinkish purple lip ..... 27. *P. semenovii* Rgl.
- + Radical leaves present; galea slightly or 1.5 times as long as lip; corolla pinkish purple, with dark purple lip ..... 28. *P. popovii* Vved.
47. Galea with very long, circinate or sigmoidally curved beak, equaling or exceeding galea ..... 48.
- + Galea without beak or with long beak, but shorter than galea . 50.
48. Corolla tube 4–8 cm long ..... 1. *P. longiflora* Rudolph.
- + Corolla tube not longer than 2 cm ..... 49.
49. Galea dorsally angular; corolla pinkish violet ..... 2. *P. rhinanthoides* Schrenk.
- + Galea dorsally rounded; corolla cream colored ..... 3. *P. peduncularis* M. Pop.
50. Stems usually branched (simple in weak samples); radical leaves absent, cauline leaves entire, oblong-lanceolate or lanceolate, incised serrate-dentate, with serrate or dentate notches at tip; flowers pendulous, solitary in axils of reduced floral leaves ..... 51.
- 694 + Stems always simple; leaf shape and segmentation different; flowers in terminal inflorescence; at least middle and upper bracts different from cauline leaves ..... 52.
51. Corolla yellowish; capsule 7–9 mm long ..... 39. *P. yezoënsis* Maxim.
- + Corolla purple (or white in albinos); capsule 11–16 mm long ..... 40. *P. resupinata* L.
52. Galea beaked; beak sometimes bidentate, teeth recurved or projecting and recurved ..... 53.
- + Galea without beak and teeth; teeth, if present, small and erect .... 91.
53. Beak of galea without teeth ..... 54.
- + Beak of galea bidentate ..... 59.
54. Galea villous ciliate in front along margin ..... 55.
- + Galea not ciliate ..... 56.
55. Calyx glabrous, 5–6 mm long ..... 49. *P. proboscidea* Stev.
- + Calyx 7–8 mm long, pubescent with long hairs ..... 50. *P. brachystachys* Bge.
56. Corolla pinkish purple ..... 57.
- + Corolla yellow ..... 58.

57. Corolla 20–24 mm long, tube falcate above ... 44. *P. nasuta* M.B.  
 + Corolla 13–15 mm long, tube erect ... 48. *P. nordmanniana* Bge.
58. Calyx (5)6(7) mm long, subcoriaceous, broadly campanulate; corolla tube scarcely curved ..... 51. *P. incarnata* L.  
 + Calyx 9–12 mm long, membranous, saccate-campanulate, swollen at base; corolla tube curved at obtuse or almost right angle ..... 52. *P. compacta* Steph.
59. Corolla yellow, with purple veins; lip almost parallel to galea ..... 46. *P. striata* Pall.  
 + Corolla purple or yellow (sometimes with purple veins on lip) ..... 60.
60. Galea hooked at tip, teeth thus pointing downward, i.e. parallel to galea axis ..... 61.  
 + Galea with teeth under tip projecting and recurved, i.e. at acute angle to galea axis ..... 66.
61. Corolla glabrous outside ..... 62.  
 + Corolla usually rather densely puberulent outside ..... 65.
62. Corolla bright pink (or white in albinos); root stout, with funiform fibers ..... 53. *P. dasystachys* Schrenk.  
 + Corolla yellow; root reduced, fibers fusiform, thickened ..... 63.
- 695 63. Leaves doubly pinnatisect; calyx veins branched, but not anastomosed ..... 62. *P. lasiostachys* Bge.  
 + Leaves pinnatisect; calyx veins forming fine reticulum ..... 64.
64. Corolla villous in throat; capsule oblong-ovate or ovate, symmetrical ..... 54. *P. physocalyx* Bge.  
 + Corolla glabrous in throat; capsule obliquely lanceolate-oblong ..... 55. *P. songarica* Schrenk.
65. Corolla pale yellow, sometimes with purple teeth; leaf segments incised-pinnatilobate ..... 56. *P. pubiflora* Vved.  
 + Corolla pink; leaf segments pinnatipartite ..... 57. *P. alatauica* Stadlm.
66. Calyx teeth narrowly deltoid or spatulate, less than 1/3 as long as tube ..... 67.  
 + Calyx teeth broadly deltoid, broader than long, several times shorter than tube ..... 78.
67. Flowers pink or pinkish purple; root vertical, branched or reduced, fibers funiform ..... 68.  
 + Flowers yellow (in one species, with purple veins on lip) ..... 71.
68. Leaves twice or almost thrice dissected into segments ..... 64. *P. rubens* Steph.  
 + Leaves pinnatisect ..... 69.

69. Calyx teeth equaling tube; leaf segments lobed or dentate; leaf axis broadly winged ..... 42. *P. sudetica* Willd.  
 + Calyx teeth 2/3 as long as tube; leaf segments pinnatipartite or pinnatisect; leaf axis not winged or narrowly winged, in latter case calyx teeth 1/3 as long as tube ..... 70.
70. Root vertical, branched; calyx teeth 2/3 as long as tube ..... 43. *P. villosa* Ldb.  
 + Root reduced, with funiform fibers; calyx teeth 1/3 as long as tube ..... 45. *P. uliginosa* Bge.
71. Leaf segments uniformly and closely pinnatipartite and deeply pinnately lobed, lobes and segments uniformly serrulate ..... 58. *P. mandshurica* Maxim.  
 + Leaf segments unequally pinnatipartite or dissected, with unequally dentate, spaced lobes and segments or leaves 2-3-pinnatisect ..... 72.
72. Galea beak long, i.e. longer than broad ..... 73.  
 + Galea beak short, i.e. shorter than broad ..... 74.
- 696 73. Beak truncate, with teeth below ..... 60. *dolichorrhiza* Schrenk.  
 + Beak ending into teeth ..... 59. *P. grandis* M. Pop.
74. Corolla yellow, with violet veins on lip ..... 68. *P. dubia* B. Fedtsch.  
 + Corolla yellow throughout ..... 75.
75. Root stout, vertical, branched ..... 68. *P. flava* Pall.  
 + Root reduced, fibers fusiform, thickened ..... 76.
76. Leaves 2-3-pinnatisect; stem and leaves crispate-pilulose, grayish ..... 65. *P. achilleifolia* Steph.  
 + Stem and leaves long crispate-hairy, sometimes villous ..... 77.
77. Calyx densely villous throughout; teeth dentate ..... 66. *P. talassica* Vved.  
 + Calyx pubescent only at base, sometimes also along veins; teeth entire ..... 67. *P. krylovii* Bonati.
78. Corolla pink or pinkish purple ..... 79.  
 + Corolla yellow, sometimes with purple beak, or white ..... 80.
79. Leaves pinnatisect; corolla tube crispate-hairy outside; corolla pink ..... 47. *P. elata* Willd.  
 + Leaves 2-3-pinnatisect; corolla tube glabrous outside; corolla pink, with purple galea ..... 61. *P. fissa* Turcz.
80. Lateral calyx teeth connate for considerable length, appearing shorter; leaf axis winged ..... 81.  
 + Sinuses between calyx teeth equally deep, teeth thus appearing equal ..... 83.
81. Lip ciliate; leaves with narrowly winged axis; capsule sub-symmetrical, oblong, about 10 mm long ..... 78. *P. altaica* Steph.



- + Lip glabrous; capsule obliquely oblong or obliquely oblong-lanceolate, extremely asymmetrical, 12–15 mm long ..... 82.
- 82. Leaf segments oblong-lanceolate; leaf axis narrow ..... 79. *P. mariae* Rgl.
- + Leaf segments oblong or ovate; leaf axis broad ..... 80. *P. schugnana* B. Fedtsch.
- 83. Calyx teeth with chondroid tip ..... 70. *P. acmodonta* Boiss.
- + Calyx teeth without chondroid tip ..... 84.
- 84. Calyx finely reticulate ..... 85.
- + Calyx veins branched, but without reticulum ..... 86.
- 697 85. Leaves pubescent with long crispate hairs along axis and veins beneath, also densely patently puberulent (puberulence sometimes absent); middle bracts 3-partite, middle part much larger, cristate-lobed ..... 69. *P. kaufmannii* Pinzger.
- + Leaves glabrous above; middle bracts pinnatisect ..... 77. *P. schistostegia* Vved.
- 86. Leaf segments deltoid-oblong, obtuse, deeply incised, pinnately lobed ..... *P. daghestanica* Bonati.
- + Leaf segments oblong or ovate, acuminate, distantly and unequally lobed or parted ..... 87.
- 87. Galea beak purple ..... 73. *P. chroorrhyncha* Vved.
- + Corolla yellow throughout ..... 88.
- 88. Capsule obliquely oblong, slightly deflexed above, almost without beak, 16–18 mm long, inflorescence pubescent with coarse, distinctly flattened hairs ..... 72. *P. sibthorpii* Boiss.
- + Capsule 9–12 mm long ..... 89.
- 89. Lip glabrous ..... 76. *P. venusta* Schangin.
- + Lip ciliate ..... 90.
- 90. Lower cauline leaves usually distant, upper crowded as if covering inflorescence; middle bracts markedly different from lower leaflike bracts ..... 74. *P. sibirica* Vved.
- + Cauline leaves gradually reduced upward, upper extremely reduced, less divided, bractlike ..... 75. *P. uralensis* Vved.
- 91. Root reduced, fibers fusiform, thickened ..... 92.
- + Root elongated, branched ..... 93.
- 92. Corolla yellowish, later with purple galea; corolla tube bent at obtuse angle below throat, galea consequently inclined forward; leaves pinnatisect, segments oblong or almost ovate, usually closely connivent or even imbricate, somewhat reclinate, not excurrent on axis ..... 94. *P. oederi* Vahl.
- + Corolla dull pinkish purple, with tube curved near calyx throat; leaves pinnatisect into oblong-lanceolate, sharply pinnatilobate segments, decurrent on winged axis ..... 95. *P. alberti* Rgl.

93. Radical leaves numerous, densely covering root neck with remnants of their broadened rigid bases; inflorescence seemingly obvolvate with cottonwool ..... 94.  
 + Root neck not obvolvate with remnants of leaf petioles ..... 97.
- 698 94. Corolla (26)30–35 mm long; capsule 15–20 mm long ..... 91. *P. adamsii* Hulten.  
 + Corolla 17–22 mm long; capsule 8–15 mm long ..... 95.
95. Galea glabrous outside or rarely sparsely pilose; filaments of two stamens villous ..... 96.  
 + Galea villous outside; stamen filaments glabrous or with isolated hairs ..... 90. *P. dasyantha* Hadac.
96. Lip ciliate ..... 89. *P. pallasii* Vved.  
 + Lip glabrous along margin ..... 88. *P. willdenovii* Vved.
97. Corolla with erect or scarcely curved tube; leaves pinnatisect into subobtusely pinnately lobed segments; especially cauline leaves with broad axis; capsule walls soft ..... 98.  
 + Corolla with somewhat curved tube; leaves pinnatisect into sharply incise-lobed segments ..... 99.
98. Corolla 24–28 mm long, reddish purple, bright; erect teeth under galea distinct ..... 92. *P. langsdorffii* Fisch.  
 + Corolla 12–16 mm long, dull pink; teeth under galea tip very minute, often scarcely discernible ..... 93. *P. hirsuta* L.
99. Bracts clearly distinguished from cauline leaves, much exceeding flowers; lower and middle bracts horizontally diverging or recurved; lateral calyx teeth spatulate, sharply toothed, equaling tube ..... 102. *P. wilhelmsiana* Fisch.  
 + Cauline leaves gradually transforming into erect bracts ..... 100.
100. Corolla yellowish ..... 101.  
 + Corolla dull pink, pinkish purple or dark purple ..... 103.
101. Plant 1–2 m tall; calyx not cleft in front ..... 96. *P. exaltata* Bess.  
 + Plant not taller than 1 m; calyx cleft in front ..... 102.
102. Calyx teeth very short, sometimes scarcely discernible ..... 97. *P. hacquetii* Graff.  
 + Calyx teeth deltoid, sometimes sparsely dentate, 1/3 as long as tube ..... 98. *P. condensata* M.B.
103. Corolla dull pink; calyx 12–15 mm long, with lateral, spatulate, sharp-toothed lobes 2/3 as long as tube ..... 101. *P. balkharica* E. Busch.  
 + Corolla pinkish purple or dark purple; calyx 6–10 mm long, with deltoid entire lobes, 1/3–1/2 as long as tube ..... 104.
- 699 104. Corolla pinkish purple; calyx 6–8 mm long, teeth 1/3 as long as tube ..... 100. *P. panjutinii* E. Busch.  
 + Corolla dark purple; calyx 9–10 mm long; teeth 1/2 as long as tube ..... 99. *P. atripurpurea* Nordm.

Section 1. *Siphonantha* Bge. in Ldb. Fl. Ross. III (1847–1849) 268. —Leaves alternate. Galea with long snout-shaped beak.

Series 1. *Longiflorae* Vved.—Corolla tube very long, several times exceeding calyx.

1. *P. longiflora* Rudolph in Mém. Acad. Sc. Pétersb. IV (1811) 345, tab. 3; Bge. in Ldb. Fl. Ross. III, 276; Turcz. in Bull. Soc. Nat. Mosc. XXIV, 2, 333; Maxim. in Mém. biol. XII, 796; Kryl. Fl. Sib. occ. X, 2499.—*P. tubiflora* Fisch. in Mém. Soc. Nat. Mosc. III (1812) 58. —*l.c.*: Rudolph, l.c.

Perennial. Root short with clustered thickened fibers. Stem reduced, branched from base or simple, glabrous, shining, densely leafy, 3–5 cm tall. Radical leaves with glabrous shining petioles shorter than lamina; lamina glabrous, sublinear, with winged axis, narrowly sinuate-pinnatifid into long semicircular, subobtusate or obtuse, crenate-dentate segments with chondroid teeth; cauline leaves with shorter, long crispate-ciliate petioles, somewhat reduced, gradually transforming into floral leaves. Flowers on long pedicels (up to 15 mm in lower flowers), singly in axils of upper crowded leaves. Calyx tubular-campanulate, 11–12 mm long, almost membranous, glabrous, half or more parted in front, 3-toothed, lateral teeth almost leaflike, 1/2 as long as tube, 3-partite; lobes spatulate, acute, sharply toothed, posterior extremely reduced, deltoid, entire, acute. Corolla yellow with very long (4–8 cm), erect, narrowly cylindrical tube; tube crispate-hairy or subglabrous outside; galea reclinate, falcate, tapering into long, falcate or S-shaped beak almost equaling galea; lip broad, 3-lobed, densely ciliate, 12–14 mm long. Stamens with villous filaments. Capsule 10–17 mm long, obliquely lanceolate, narrowed at both ends, rather abruptly transformed into short beak. Flowering from July to August. Fruiting from August to September.

In damp alpine and subalpine meadows.—*Western Siberia*: Altai Mountains; *Eastern Siberia*: Angara-Sayan, Dauria. *General distribution*: Mongolia, Tibet, Himalayas (?). Described from Lake Baikal. Type in Leningrad.

Series 2. *Rhinanthoideae* Vved.—Corolla tube comparatively short, slightly exceeding calyx.

700 2. *P. rhinanthoides* Schrenk, Enum. pl. nov. 1 (1841) 22; Ldb. Fl. Ross. III, 276; Maxim. in Mém. biol. XII, 786; Kryl. Fl. Sib. occ. X, 2500; Hook. Fl. Brit. Ind. IV, 314. —*l.c.*: Ann. Bot. Gard. Calcutta, III, tab. 1, f. B.

Perennial. Plant glabrous. Stems 1–3, simple, erect or flexuous, ascending at base, shining, slightly ribbed, 2–4 times as long as leaves, 10–25 cm tall. Radical leaves petiolate, linear-lanceolate, with winged



axis, pinnatipartite, lobes orbicular with acute chondroid teeth or pinnately lobed, horizontally diverging, lobes chondroid-pointed, 1–2-toothed, cauline leaves alternate, short-petiolate, but similar, gradually transforming into bracts. Inflorescence capitate, 1–9 flowered. Bracts leaflike, with broad, short petioles. Calyx (up to 7 mm long in lower flowers) oblong-ovate,  $5 \times 13$  mm, herbaceous, with 10 nerves, blackspotted, glabrous or with isolated hairs, almost  $1/2$  cleft in front, unequally 5-toothed, lateral teeth 3 mm long, spatulate, chondroid-pointed, chondroid-dentate, upper tooth subulate,  $1/2$  as long as others. Corolla pink 17–24 mm long, with narrow erect tube, galea bidentate in throat, dorsally angular, tapering into long, annular, finally S-shaped snoutlike beak; lip transversely oval,  $8-9 \times 14-17$  mm, 3-lobed, middle lobe broadly obcordate,  $3.5 \times 6$  mm. Filaments of two stamens pilose. Capsule obliquely oblong, about 2 cm long. Flowering from July to August. Fruiting from August to September.

In damp meadows in upper mountain zone.—*Soviet Central Asia*: Dzh.-Tarbagatai, Tien Shan, Pamiro-Alai. *General distribution*: Mongolia, India-Himalayas. Described from Baskan River (Dzhungar Ala-Tau). Type in Leningrad.

3. *P. peduncularis* M. Pop. sp. n.—*P. rhinanthoides* var. *flaviflora* Bonati in Bull. Soc. Bot. France, 61 (1914) 231.—*P. rhinanthoides* ssp. *rotundata* Vved. in Sched. in Herb. Fl. As. Med. VII (1925) No. 173.

703 Perennial. Plant glabrous or with isolated crispate hairs. Stems several, simple, partially ascending, weak, sometimes almost decumbent, 10–20 cm tall. Radical leaves with long petioles equaling lamina; cauline leaves alternate, rarely opposite, short-petiolate; lamina linear-lanceolate or linear-oblong, pinnatisect into ovate or oblong, sharply chondroid-pointed close-set segments. Inflorescence many-flowered, racemose, lax with distant lower flowers. Lower pedicels up to 2.5 cm long, obliquely erect. Bracts similar to cauline leaves, but smaller, subsessile. Calyx tubular, later slightly inflated, 9–13 mm long, with 5 prominent and 5 intermediate, less prominent, branched veins; teeth  $1/6-1/5$  as long as tube, broadened above, chondroid-dentate, upper tooth similar to others, but reduced. Corolla white or cream with slender, erect 10–17 mm long tube; galea dorsally rounded, tapering into long, annular, incurved beak, tooth in throat absent; lip  $13 \times 16$  mm, 3-lobed, middle lobe larger than lateral lobes. Filaments of two stamens villous. Capsule 13–18 mm long. Flowering from June to August. Fruiting from July to September (Plate XXXVI, fig. 1).

In damp meadows in upper mountain zone.—*Soviet Central Asia*: Tien Shan (west), Pamiro-Alai. Endemic. Described from upper reaches of Karatag River (Hissar Range). Type in Leningrad.

Section 2. *Cyclophyllum* Bge. in Ldb. Fl. Ross. III (1847–1849) 268.—Leaves whorled, lower leaves sometimes opposite.

Series 1. *Tenuirostres* Vved.—Root vertical. Beak long, equaling galea, with two obtuse teeth under throat.

4. *P. tianschanica* Rupr. in Mém. Acad. Sc. Pétersb. VII sér. XIV, 4 (1869) 63; Maxim. in Mém. biol. XII, 811.

Perennial. Root vertical, rather stout. Stems 1-several, simple, erect, slender, colored, glabrous below, long crispate-hairy above, especially under inflorescence, 20–30 cm tall. Radical leaves with glabrous petioles equaling lamina; lamina glabrous, with winged axis, linear-lanceolate, pinnatisect into oblong-lanceolate, spaced, chondroid-pointed, chondroid-dentate segments; cauline leaves in 3–4 whorls (lower opposite), upper smaller, short-petiolate, uppermost leaves sessile, villous at base. Flowers in few-flowered, dense, villous inflorescence, interrupted in lower part. Bracts slightly exceeding calyx, rhomboid, 3-lobed, middle lobe deltoid, serrate, lateral lobes linear, small, serrate, sometimes recurved. Calyx campanulate, membranous, with prominent, herbaceous, unbranched veins, villous, 7–8 mm long, with deltoid, acute, serrate teeth almost equaling tube. Corolla yellow (?), 10–11 mm long, tube curved, almost equaling calyx; galea semiorbicular, with broad tooth in front, tapering into curved beak, 704 beak equaling galea; lip very large, serrate, 3-lobed, 10–12 mm long. Filaments glabrous. Flowering in July.

In juniper forests.—*Soviet Central Asia*: Tien Shan (Valley of Arpa River), Pamiro-Alai (Alai Range). Endemic. Described from valley of Arpa River. Type in Leningrad.

Series 2. *Chamissonianae* Vved.—Root vertical. Galea with comparatively short (shorter than galea) beak. Leaf segments decurrent on axis. Capsule asymmetrical.

5. *P. chamissonis* Stev. in Mém. Soc. Nat. Mosc. 6 (1823) 20, tab. 4, f. 1; Bge. in Ldb. Fl. Ross. III, 274; Maxim. in Mém. biol. XII, 858 (excl. fig.).—*P. romanzovii* Chamiss. ex. Spr. Syst. II (1825) 778.—*Ic.*: Stev. l.c.

Perennial. Root vertical, branched. Stems single or 2–3, simple, erect, rather stout, glabrous, crispate-hairy under inflorescence and its axis, 20–40 cm tall. Radical leaves with petioles nearly equaling lamina; lamina glabrous, lanceolate-oblong in shape, pinnatisect into oblong, pinnately lobed segments decurrent on axis, giving it winged appearance; lower segments somewhat distant, upper overlapping; lobes of segments obtuse, serrate, usually chondroid; cauline leaves in 3–5 whorls, reducing upward, gradually transforming into bracts, short-petiolate, with subobtuse, less serrated lobes of segments. Flowers in capitate or oblong inflorescence, usually interrupted in lower part. Lowermost bracts leaflike, middle linear-lanceolate, chondroid-serrate at tip, crispate-ciliate

in lower part, shorter than flowers. Calyx campanulate, membranous, with herbaceous veins, glabrous, 7–8 mm long, with deltoid, entire, acute, crispate-ciliolate teeth, several times shorter than tube. Corolla pink, 18–20 mm long, tube curved in calyx throat almost at right angle, 2 times as long as galea; galea somewhat recurved, tapering into rather long, projecting beak; lip large, 3-lobed, ciliate, slightly exceeding galea. Filaments glabrous.

Capsule 10–12 mm long, obliquely oblong, almost semiorbicular, abruptly ending into unilateral; short, erect or diverging beak. Flowering from July to August. Fruiting from August to September (Plate XXXIX, fig. 1).

In alpine and subalpine meadows. *Soviet Far East*: Kamchatka, Commander Islands, Sakhalin, Kuril Islands. *General distribution*: Aleutian Islands, northern Japan. Described from Unalaska. Cotype in Leningrad.

Series 3. *Crassirostres* Vved.—Root vertical, comparatively slender. Galea with comparatively short (shorter than galea) beak. Leaf segments distant, not decurrent on axis. Capsule asymmetrical.

705 6. *P. crassirostris* Bge. in Bull. Sc. Acad. Pétersb. VIII (1841) 248; Bge. in Ldb. Fl. Ross. III, 275; Boiss. Fl. or. IV, 488; Maxim. in Mém. biol. XII, 863, f. 89; Grossh. Fl. Kavk. III, 402.—*P. armena* Bge. in Mém. Acad. Sc. Pétersb. VI sér. VII (1858) 594.—? *P. araratica* Bge. l.c.—*P. crassirostris* var. *araratica* Krause in Verh. bot. Ver. Brandenb. 55 (1913) 32 (nomen nudum).—*l.c.*: Maxim. l.c.

Perennial. Root vertical, comparatively slender, branched. Stems usually several, simple, erect or often ascending at base, colored, shining, with 4 crispate-hairy lines, (3)5–10(20) cm tall. Radical leaves with crispate-hairy petioles nearly as long as lamina; lamina glabrous, pinnatisect, with spaced, oblong, coarsely pinnatilobate segments; lobes of segments with short mucro or tooth; cauline leaves in 2–3(4) whorls, lower sometimes opposite, with shorter petioles, upper leaves often sessile, reduced, otherwise similar. Flowers on short pedicels, in few-flowered, capitate, or often somewhat elongated inflorescence, interrupted in lower part. Lowermost bracts sometimes leaflike, middle deltoid, deeply pinnatipartite, with dentate lobes, somewhat densely long, crispate-hairy. Calyx narrowly campanulate, with slightly oblique throat, with herbaceous veins, densely long crispate-hairy, with linear-deltoid, acute, entire or dentate teeth,  $2/3$  as long as tube. Corolla purple, 12–20 mm long, tube curved, sometimes almost at right angle, above calyx throat; galea straight or slightly curved, gradually tapering in front or somewhat erect, with obliquely truncate beak usually exceeding cross-section of galea; lip large, 3-lobed, usually equaling galea, 5–9 mm long. Stamens with glabrous filaments. Capsule





obliquely lanceolate, or obliquely oblong-lanceolate, 14–18 mm long. Flowering from July to August. Fruiting from August to September.

In subalpine and alpine meadows.—*Caucasus*: Ciscaucasia, Dagestan, western, eastern and southern Transcaucasia. *General distribution*: Asia Minor. Described from vicinity of Chkmeri. Type in Leningrad.

*Note*. Polymorphic species, deserving further study. Refer also to note on *P. subrostrata*.

Series 3. *Amoenae* Vved.—Root reduced, fascicular. Galea without beak. Corolla tube curved below middle. Anthers connivent.

7. *P. macrochila* Vved. in HFAM, VII (1925) No. 172.—*P. amoena* var. *elatio*r Rgl. in AHP, 6 (1880) 348.—*P. amoena* (non Adams) Maxim. in Mém. biol. XII, f. 115.—*P. hulteniana* Li in Proc. Ac. Nat. Sc. Philad. C. (1948) 310; f. 40.—*P. verticillata* auct. fl. As. Med.—*lc.*: Maxim. *l.c.*—*Exs.*: HFAM, No. 172; Pavlov and Lipschitz, No. 191.

706 Perennial. Root short, with funiform, scarcely thickened fibers. Stems (1)4–6, simple, erect or partially ascending, slightly angular, glabrous throughout or with 4 indistinct, hairy lines, shining, 25–50 cm tall. Radical leaves often absent, 1/4–1/3 as long as stem, glabrous throughout, long-petiolate, lanceolate, pinnatisect; segments distant, linear-lanceolate, with acute, chondroid, coarse teeth, teeth repeatedly denticulate; cauline leaves in 2–4 whorls (lower leaves often opposite), with larger lamina, shorter petioles, otherwise similar. Inflorescence dense, often interrupted at base, more lax in fruit. Lower and middle bracts longer than flowers, similar to cauline leaves, but reduced, middle bracts slightly broadened and covered with long crispate hairs at base; upper bracts crispate-hairy, deltoid, nearly equaling flowers, 3-partite, middle part linear-lanceolate, pinnatisect, with chondroid-dentate segments, lateral segments extremely reduced, linear, chondroid-dentate; uppermost bracts similar, but reduced and less dissected. Calyx subsessile, campanulate, 7–8 mm long, often purple, with linear, entire, chondroid-pointed, crispate-hairy teeth, slightly shorter than tube. Corolla pinkish violet, 18–20 mm long; tube curved in calyx throat; galea suberect, slightly dorsally inflated, 1/2–2/3 as long as lip; lip broad (8–10 × 14–16 mm), 3-lobed; middle lobe orbicular, 4–5 mm broad. Filaments of two stamens villous. Capsule 8–12 mm long, obliquely oblong, gradually tapering into beak. Flowering from May to July. Fruiting from June to August.

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Plate XXXV.

1. *Pedicularis hirsuta* L., General appearance of plant, leaf, flower, 2. *P. korolkovii* Rgl., general appearance of plant, leaf, flower, capsule.—3. *P. pallasii* Vved., general appearance of plant, flower, leaf.—4. *P. amoena* Adams, leaf.—5. *P. eriophora* Turcz., leaf.

On grassy slopes in middle mountain zone. *Soviet Central Asia*: Dzh.-Tarbagatai, Tien Shan, Pamiro-Alai (Alai Range). *General distribution*: Kuldzha. Described from Taldybulak (Kirgizsk Ala-Tau). Type in Tashkent.

8. *P. arguteserrata* Vved. sp. nov. in Addenda XXI, 809.

Perennial. Root reduced, with funiform fibers. Stems often several, simple, erect, shining, with 4 hairy lines, 10–30 cm tall. Radical leaves (sometimes absent) long-petiolate,  $1/3$ – $1/2$  as long as stem, with isolated crispate hairs, lanceolate, pinnatisect; segments distant, linear-lanceolate or sublinear, acute, serrulate or sometimes subentire; cauline leaves in 2–3 whorls, lower leaves sometimes opposite, short-petiolate or sessile, otherwise similar. Inflorescence dense, interrupted in lower part. Lower bracts leaflike, longer than flowers, middle and upper bracts shorter, broadened and crispate-hairy at base, deltoid, 3-partite, lobes regularly serrate, middle lobe repeatedly 3-partite. Calyx on very short pedicel, campanulate, 6–7 mm long, often violet, membranous and crispate-hairy above; teeth with deltoid base, linear, acute, slightly shorter than tube. Corolla pinkish violet, 17–18 mm long; tube curved in calyx throat, with suberect galea slightly shorter than lip; lip broadly 3-lobed, 7–8 mm long. Filaments of two stamens pilose. Capsule broad, obliquely oblong, abruptly transformed into short, straight, almost erect beak. Flowering in July. Fruiting in August.

Meadows and open forests.—*European USSR*: Ural Mountains; *Western Siberia*: Altai Mountains; *Eastern Siberia*: Angara-Sayan. *General distribution*: Mongolia. Described from vicinity of Manskoe Lake (of Sayan). Type in Leningrad.

*Note*. There are few Ural plants in herbaria; and they require further study.

9. *P. korolkovii* Rgl. in Trud. Peterb. bot. sada, 6 (1880) 349.—*Exs.*: HFAM, No. 170 (sub. *P. amoena*).

Perennial. Root short, with long, fusiform fibers. Stems several, simple, erect or ascending at base, shining, with 4 hairy lines, 2–3 times as long as radical leaves, scaly at base, 10–20 cm tall. Radical leaves with shining, glabrous or diffusely crispate-hairy petioles; lamina linear-lanceolate, glabrous or with scattered, isolated, crispate hairs, pinnatifid, lobes linear or lanceolate, sharply pinnatifid, decurrent; cauline leaves in 1(2) whorls, sessile or subsessile, otherwise similar. Inflorescence dense, lower whorl distant. Lower bracts leaflike, deeply pinnatifid, with sharply dentate lobes, somewhat crispate-pubescent, middle bracts ovate or lanceolate, crispate-villous, 2–3-lobed, with obscurely dentate lobes, lowermost bracts linear, entire.



Calyx campanulate, 6–8 mm long, on short pedicel, membranous, with 10 villous veins, unequally 5-toothed, lateral teeth deltoid, herbaceous only at tip, chondroid-serrate,  $1/2$  as long as tube; upper tooth membranous, broadly deltoid, all teeth subobtuse, crispate-villous along margin. Corolla 15–17 mm long, pinkish violet, markedly curved above calyx throat; galea slightly curved, rounded, extremely broadened toward base; lip 3-lobed, equaling or scarcely exceeding galea, 9–11 mm broad, with ovate middle lobe. Filaments of two stamens with isolated hairs. Capsule 12–15 mm long, obliquely oblong or obliquely oblong-lanceolate, gradually tapering into 12–15 mm long beak. Flowering from June to September. Fruiting from August to September (Plate XXXV, fig. 2).

Meadows in high-altitude zone.—*Soviet Central Asia*: Tien Shan (west). Described from Onaulgan (Talas Ala-Tau). Type in Leningrad.

*Note.* This species is remarkably close to *P. amoena* Adams, from which it is distinguished by more thickened roots, a corolla lip slightly shorter than the galea, somewhat different leaf segmentation, similar to that in *P. macrochila* m., and a larger capsule gradually tapering into a usually straight beak. It is also close to *P. violascens* Schrenk, from which it is distinguished by a longer lip and the absence of the violet pubescence of inflorescence remarkably characteristic of this species. Where it comes in contact with *P. violascens*, *P. korolkovii*, evidently hybridizes.

10. *P. eriophora* Turcz. in Bull. Soc. Nat. Mosc. XXIV, 2 (1851) 333 in adn.; Hulten in Kungl. Sven. Vet. Hand. VIII, 2, III, tab. 5. f. d, e, f.—*P. amoena* auct. fl. kamtsch.—*lc.*: Hulten, l.c.

Perennial. Root reduced, with funiform fibers, Stems usually several, simple, erect or ascending at base, often violet, shining, with 4 crispate-pubescent or crispate-hairy lines, 5–20 cm tall. Radical leaves long-petiolate,  $1/3$ – $1/2$  as long as stem, crispate-hairy or often subglabrous, linear-lanceolate, pinnatisect, with very distant, obversely oblong or oblanceolate, patently crenate segments; cauline leaves in 1–2 whorls, short-petiolate, otherwise similar. Inflorescence dense, interrupted in lower part, sometimes densely crispate-hairy. Lowermost bracts often leaflike, exceeding flowers, middle and upper bracts shorter than flowers, deltoid, broadened, and crispate-hairy, sometimes densely so at base, pinnatipartite into patently sharp-lobed or dentate lobes. Calyx on short pedicel, campanulate, 8–9 mm long, subglabrous or densely crispate-hairy, teeth linear with deltoid base, very acute, entire or serrate, at least  $2/3$  as long as tube. Corolla pinkish violet, 16–20 mm long, tube curved in calyx throat, galea falcate, lip broad, 3-lobed, slightly exceeding galea, 7–8 mm long. Stamens with glabrous filaments. Capsule 10–12 mm long,

obliquely oblong, falcate at tip, abruptly ending into short beak. Flowering from June to August. Fruiting from July to August (Plate XXXV, fig. 5).

In alpine meadows, on stony slopes.—*Soviet Far East*: Kamchatka, Okhotsk. Endemic. Described from Kamchatka. Type in Leningrad.

709 *Note*. The geographical boundary between *P. eriophora* and *P. amoena* is not clear at present, due to the scarcity of material from the eastern part of the Lena-Kolyma Region.

11. *P. amoena* Adams ex Stev. in Mém. Soc. Nat. Mosc. VI (1823) 25, tab. 7; Bge. in Ldb. Fl. Ross. III, 271; Turcz. in Bull. Soc. Nat. Mosc. XXIV, 2, 332; Maxim. in Mém. biol. XII, 878 (excl. fig.); Kryl. Fl. Zap. Sib. X, 2497.—*P. arctica* M.B. ex Stev. l.c.—*l.c.*: Stev. l.c.

Perennial. Root reduced, with funiform fibers. Stems 1–4(12), simple, erect, or often ascending at base, with 4 crispate-pubescent lines, and often crispate-pubescent throughout, especially in lower part, 5–15 cm tall. Radical leaves long-petiolate, 1/2 as long as stem, diffusely crispate-hairy or subglabrous, linear-lanceolate, pinnatisect, with distant lanceolate or linear-lanceolate segments with sharply toothed lobes; cauline leaves in 1–2 whorls, short-petiolate, otherwise similar. Inflorescence capitate, sometimes slightly interrupted in lower part. Lowermost bracts often leaflike and exceeding flowers, middle and upper bracts shorter, deltoid, almost palmately pinnatipartite, with linear, sparsely toothed or subentire lobes, often violet, long crispate-ciliate. Calyx on very short pedicel, campanulate, membranous, often violet, 6–8 mm long, subglabrous, teeth narrowly deltoid or linear with deltoid base, very acute, entire or sparsely denticulate, 2/3 as long as tube. Corolla pinkish violet, 15–20 mm long, tube curved in calyx throat; galea slightly falcate; lip very broad, 3-lobed, at least 2/3 as long as galea, 8–10 mm long. Stamens with glabrous filaments or two of them long, diffusely hairy. Capsule 8–12 mm long, obliquely ovate or oblong-ovate, sometimes slightly curved at tip, abruptly ending into short beak. Flowering from June to August. Fruiting from July to August (Plate XXXV, fig. 4).

In lichen tundra, on stony slopes in alpine zone.—*Arctic Region*: Arctic Europe (Bolshezemelskaya tundra), Arctic Siberia, Chukotka, Anadyr; *Western Siberia*: Altai Mountains; *Eastern Siberia*: Lena-Kolyma, Angara-Sayan, Dauria; *Soviet Far East*: Okhotsk (?); *Soviet Central Asia*: Dzh.-Tarbagatai (Saur). *General distribution*: Mongolia. Described from mouth of Lena River. Type in Leningrad.

12. *P. violascens* Schrenk, Enum. pl. nov. II (1842) 22; Bge. in Ldb. Fl. Ross. III, 270; Maxim. in Mém. biol. XII, 883, f. 112 (excl. *P. korolkowi* 710 Rgl.); Kryl. Fl. Zap. Sib. X, 2496.—*P. amoena* var. *violascens* Rgl. in

Bull. Soc. Nat. Mosc. XLI, 1 (1868) 108.—*P. socalsku* Bonati in Bull. Soc. Bot. Genève, II sér. 5 (1913) 315, f. 13, 2.—*l.c.*: Maxim. *l.c.*; Bonati, *l.c.*

Perennial. Root short, with funiform, often thickened fibers. Stems 1–3, simple, erect or ascending at base, lustrous, covered with scattered crispate hairs, sometimes forming 4 obscure lines, 2–3 times as long as radical leaves, scaly at base, (5)10–20 cm tall. Radical leaves petiolate, covered with scattered crispate hairs, lanceolate, glabrous above, crispate-hairy beneath along veins, pinnatipartite, with winged axis, segments oblong-lanceolate, pinnately lobed, subobtuse, chondroid-margined, their lobes with chondroid edge and reflexed teeth; cauline leaves in 1–2 whorls, subsessile, villous at base, reduced, otherwise similar. Inflorescence elongated, usually interrupted in lower part, somewhat villous with slightly violet crispate hairs. Lower bracts exceeding calyx, deltoid with broad base, with middle part elongated, cristate-lobed, involute along margin, lateral parts dentate, with involute margin; upper bracts reduced, almost equaling calyx, with dentate lobes involute along margin; all bracts with subobtuse chondroid-tipped lobes, violet-villous. Calyx subsessile, 9–10 mm long, campanulate, membranous, violet, with 10 veins villous with long crispate hairs, unequally 5-toothed, with lateral teeth 2–5 mm long, deltoid-linear, subobtuse or subacute, entire, upper tooth at least 1/2 as long, deltoid, entire, all teeth with long crispate hairs along margin. Corolla pinkish violet, 16–18 mm long, tube curved in calyx; galea recurved, broad, rounded along back and above, concave in front, longer than lip; lip paler in color (?), 3-lobed, 6 × 9 mm, serrate, reniform, middle lobe constricted from broad base, orbicular. Filaments of two stamens with isolated hairs. Capsule oblong-lanceolate, sometimes swordlike curved, 13–15(20) mm long. Flowering from July to August; fruiting from August to September.

On stony slopes in upper mountain zone.—*Western Siberia*: Altai Mountains (?); *Soviet Central Asia*: Dzh.-Tarbagatai, Tien Shan, Pamiro-Alai (eastern part). *General distribution*: Mongolia, Dzh.-Kashgar. Described from Dzhabyk Summit (Dzhungar Ala-Tau). Type in Leningrad.

*Note*. Examination of the many cotypes of *P. socalskii* Bonati in the herbarium of Bot. Inst. Akad. SSSR showed that it is *P. violascens* Schrenk, which is common in the Trans-Ili Ala-Tau. Due to the faulty drying of the plants, Bonati incorrectly ascribed yellow flowers to his species. In any case, one of the labels of the cotypes contains the postscript  
711 “flowers, similar to *Isopyr [um] grandif [lorum]*”, i.e., they were light lilac.

Series 4. *Caucasicae* Vved.—Root vertical, comparatively slender. Galea without or with very short beak. Corolla tube abruptly curved from middle or slightly above, or smoothly falcate; lip nearly equaling galea.



13. *P. subrostrata* C.A.M. Verz. Pflanz. Cauc. Casp. Meer. (1831) 108; Bge. in Ldb. Fl. Ross. III, 272; Boiss. Fl. or. IV, 488; Maxim. in Mél. biol. XII, 873, f. 98; Grossh. Fl. Kavk. III, 402.—*lc.*: Maxim. l.c.—*Exs.*: GRF, No. 1177.

Perennial. Root vertical, comparatively slender, branched. Stems single or often several, erect or often ascending, slender, colored, shining, with 2–4 crispate-hairy lines, 5–10 cm tall. Radical leaves usually numerous, petioles with long crispate hairs, nearly equaling lamina; lamina glabrous, linear-lanceolate, pinnatisect into oblong-lanceolate, slightly spaced, subacute or subobtuse, pinnately lobed segments, with acute or subobtuse lobes; cauline leaves in 1–2 whorls, short-petiolate or sessile, long crispate-ciliate at base, otherwise similar. Flowers in few-flowered, capitate or oblong inflorescence, lower flowers sometimes somewhat distant. Bracts shorter than flowers, densely crispate-hairy mainly at base, obovate or rhombic, deeply pinnately lobed (middle bracts 3-lobed or all entire, ovate), lobes of lower bracts dentate, of upper bracts subentire. Calyx campanulate, 6–8 mm long, densely crispate-hairy, teeth narrowly 3-lobed, entire, acute,  $1/2$ – $2/3$  as long as tube. Corolla pink, 15–16 mm long, tube curved at right angle slightly above middle, a little above calyx throat; galea almost straight, somewhat reclinate, tapering above into very short, projecting, obliquely truncated, consequently bidentate beak; lip rather large, 3-lobed, nearly equaling galea. Stamen with glabrous filaments. Capsule obliquely oblong, 10–12 mm long. Flowering from June to August. Fruiting from August to September.

In alpine meadows.—*Caucasus*: Ciscaucasia, eastern Transcaucasia (western part). Endemic. Described from alpine region of western Transcaucasia (western part of Main Range). Type in Leningrad.

*Note.* Possibly, it is a recent hybrid between *P. pontica* and *P. crassirostris*, as shown by many of its intermediate features and by its occurrence with these species. Relevant observations in their populations are  
712 necessary. Possibly, *P. araratensis*, which distinguished from *P. subrostrata* mainly by a less curved corolla tube is also this species.

14. *P. pontica* Boiss. Fl. or. IV (1879) 485 (quoad specim. Balansae); Grossh. Fl. Kavk. III, 403.—*P. caucasica* auct. fl. cauc. p.p.

Perennial. Root fusiform, comparatively slender, branched. Stem 5–10 cm tall, generally single, rarely up to 3, simple, erect or ascending at base, slender, colored, shining, with 4 crispate-hairy lines, sometimes almost villous under inflorescence. Radical leaves with long crispate hairy petioles, approximately equaling lamina; lamina glabrous or crispate-hairy along axis, lanceolate, pinnatisect into oblong, slightly spaced, subobtuse, deeply pinnatilobate segments, their lobes subobtuse, sometimes with

tooth; cauline leaves in (1)2 whorls, with shorter petioles, upper leaves sometimes acute, with broader axis, sometimes bractlike, otherwise similar. Flowers in few-flowered, capitate or oblong, almost arachnoid-villous inflorescence. Bracts ovate at base, somewhat tapering above, crispate-hairy mainly at base, shorter than flowers, lowermost bracts lobed, middle entire. Calyx campanulate, 8–9 mm long, densely long crispate-hairy, teeth sublinear, very sharp, serrate or entire, slightly shorter than tube. Corolla pink, 16–18 mm long, tube curved at right angle near middle, slightly above calyx throat; galea slightly reclinate, seemingly truncate at tip, tooth scarcely discernible as a result; lip large, 3-lobed, equaling galea, 6–7 mm long. Stamens with glabrous filaments. Capsule obliquely oblong-lanceolate, about 1 cm long. Flowering from June to August.

In alpine meadows, on debris and stony slopes in upper-mountain zone.—*Caucasus*: Ciscaucasia, western Transcaucasia (northern part). *General distribution*: Asia Minor. Described from several places in north-eastern regions of Asia Minor.

15. *P. caucasica* M.B. Fl. taur.-cauc. II (1808) 72; Bge. in Ldb. Fl. Ross. III, 272; Boiss. Fl. or. IV, 483; Maxim. in Mél. biol. XII, 894; Grossh. Fl. Kavk. III, 403 (excl. syn. *P. burgaei*).—*P. nudicaulis* C. Koch in Linnaea, XVII (1843) 289.—*P. armena* Boiss. and Huet, Diagn. pl. or. nov. II, 3 (1856) 175; Grossh. Fl. Kavk. III, 403.—*lc.*: Stev. in Mém. Soc. Nat. Mosc. VI, tab. 8 (mala).—*Exs.*: Herb. Fl. Cauc. No. 590.

713 Perennial. Root vertical, slender, with comparatively thick branches. Stems usually single or rarely 2–3, simple, erect, usually thickset, with 4 usually crispate-hairy lines, 5–10(15) cm tall. Radical leaves with petioles approximately equaling lamina, crispate-hairy along petiole and axis; lamina linear-lanceolate (lowermost sometimes with broad axis), with oblong, short-pointed, deeply pinnately lobed segments, lobes short-pointed, sometimes with tooth; cauline leaves in 1–2 whorls, short-petiolate or sessile, covered, especially at base, with long crispate hairs, otherwise similar; upper leaves sometimes bractlike. Flowers (lowermost sometimes on 5 mm long pedicels) in capitate or oblong inflorescence, often interrupted at base. Bracts shorter than flowers, somewhat densely crispate-hairy or subglabrous, with oblong-ovate or ovate base, tapering above, serrated at tip. Calyx campanulate, 9–11 mm long, somewhat densely crispate-hairy or subglabrous, with deltoid-linear, very sharp, entire or serrate teeth, slightly shorter than, or often  $\frac{2}{3}$  as long as tube. Corolla yellowishwhite, sometimes pink along galea or rarely pink throughout, 17–20 mm long; tube smoothly falcate; galea straight, reclinate, straight in front, tip rounded in front, without tooth; lip larger, 3-lobed, equaling galea, 6–7 mm long.

Filaments of two stamens pilose. Capsule obliquely oblong-lanceolate, 8–12 mm long. Flowering from June to July. Fruiting from July to August.

In alpine meadows and on stony slopes in upper-mountain zone.—*Caucasus*: Ciscaucasia, Dagestan, western, southern and eastern Transcaucasia. *General distribution*: Armenia-Kurdistan. Described from alpine region of eastern Caucasus and Georgia.

Series 5. *Cheilanthisfoliae* Vved.—Root reduced, fasciculate. Galea with short beak; corolla tube curved much below middle; lip 2/3 as long as galea.

16. *P. cheilanthisfolia* Schrenk in Bull. phys.-math. Acad. Pétersb. I (1842) 79; Enum. pl. nov. II, 19; Ldb. Fl. Ross. III, 273; Maxim. in Mém. biol. XII, 864.—*P. cheilanthisfolia* var. *variegata* Rupr. in Mém. Acad. Sc. Pétersb. VII sér. XIV, 4 (1869) 63.—*lc.*: Prain in Ann. Bot. Gard. Calcutta, 3, tab. 32, f. A, B.

714 Perennial. Root with closely clustered branches, fibers almost funiform. Stems single-several, ascending, slender, shining, with 4 crispate-pubescent lines, scaly at base, 2 times as long as radical leaves, 5–15 cm tall. Radical leaves numerous, petiolate, sublinear, glabrous above, with short scattered hairs beneath, pinnatipartite, lobes ovate, involute along margin, sharply chondroid-dentate, connivent at leaf end; cauline leaves in whorl of 4, with shorter, more densely pubescent petioles, slightly reduced, otherwise similar. Inflorescence capitate, usually few-flowered. Bracts crispate-hairy along margin and back, 1.5–2 times as long as calyx, broad, almost scarious at base, palmately parted, middle lobe elongated, pinnatipartite into chondroid-pointed lobes with sharply chondroid teeth; lateral teeth sharply chondroid, all involute along margin. Calyx tubular-campanulate, membranous, 9–12 mm long, on short pedicel, with 5 thick and 5 thin crispate-hairy veins, without reticulum, unequally 5-toothed; lateral teeth deltoid, about 2 mm long, chondroid-pointed, with sharply chondroid teeth, involute along margin, upper tooth deltoid, entire. Corolla 20–25 mm long, bent in calyx tube; galea short-beaked, falcate, purple, 1.5 times as long as lip, corolla sometimes white; lip 6.5–7 × 12–13 mm, deeply 3-lobed, base abruptly broadened, with reduced lateral lobes; middle lobe constricted from broad base, ovate. Stamens with glabrous filaments. Capsule obliquely oblong-lanceolate, 12–17 mm long. Flowering from July to August. Fruiting from August to September.

Along rubbly and clayey slopes in upper-mountain zone.—*Soviet Central Asia*: Dzh.-Tarbagatai, Tien Shan, Pamiro-Alai. *General distribution*: Dzh.-Kashgar. India-Himalayas. Described from Iskuli Mountain (Dzhungar Ala-Tau). Type in Leningrad.



Series 6. *Verticillatae* Vved.—Root vertical, weak. Galea without beak; corolla tube curved much below middle. Anthers spaced in pairs.

17. *P. verticillata* L. Sp. pl. (1753) 608; Bge. in Ldb. Fl. Ross. III, 270; Turcz. in Bull. Soc. Nat. Mosc. XXIV, 2, 330; Kryl. Fl. Zap. Sib. X, 2495; Maxim. in Mém. biol. XII, 158, f. 123.—*P. stevenii* Bge. in Ldb. Fl. Alt. II (1829) 427.— *Ic.*: Rchb. Ic. fl. germ. tab. 1762.— *Exs.*: Pl. Finl. exs. No. 938; Fl. gall. and germ. exs. No. 433.

715 Perennial. Root vertical, weak, branched. Stems usually several, simple, erect or ascending at base, with 4 somewhat distinct crispate-hairy lines, (5)10–15(30) cm tall. Radical leaves with crispate-hairy petioles slightly exceeding lamina; lamina somewhat reduced compared with lower cauline leaves, with long crispate hairs or subglabrous, linear-lanceolate, pinnatisect into broadly oblong or suborbicular, large-toothed, intensely chondroid-margined segments; cauline leaves in (1)2(3) whorls, lower sometimes opposite, with shorter petioles, upper often sessile, reduced upward, otherwise similar. Flowers short-pedicellate; inflorescence capitate, elongated, often interrupted in lower part in fruit. Lowermost bracts leaflike, middle lanceolate, crispate-ciliate (sometimes only in lower part), pinnately lobed or with intensely chondroid-margined teeth, shorter than flowers. Calyx 5–7 mm long, slightly inflated, membranous, with herbaceous, crispate-hairy veins, slightly enlarged in fruit, intensely lacinated in front, with acute deltoid, entire or dentate teeth 1/3 as long as tube. Corolla purple, 14–20 mm long; tube curved almost at right angle, smoothly broadened at throat, galea reclinate, slightly falcate, without beak; lip large, 3-lobed, slightly exceeding galea, 6–8 mm long. Stamens usually spaced (by width of anther) in pairs; filaments of two stamens pilose. Capsule with soft valves, subsymmetrical, lanceolate or linear-lanceolate, acute, unilaterally dehiscent, 10–15 mm long. Flowering from June to July. Fruiting from July to August.

In mossy and lichen tundra, in mountains along banks of rivers and rivulets in middle zone and in meadows and on stony slopes in upper zone.—*Arctic Region*: Arctic Europe, Arctic Siberia, Chukotka, Anadyr; *European USSR*: Karelia-Lapland, Dvina-Pechora, Upper Dniester, Ural Mountains; *Western Siberia*: Altai Mountains; *Eastern Siberia*: Lena-Kolyma, Angara-Sayan, Dauria; *Soviet Far East*: Kamchatka, Okhotsk, Zeya-Bureya, Uda Region, Ussuri, Sakhalin (Kurils?). *General distribution*: Central and Southern Europe. Alaska, Mongolia, Japan, China. Described from Siberia, Switzerland and Austria.

Series 7. *Interruptae* Vved.—Root vertical, stout. Galea with short beak; corolla tube curved in middle, lip 1/2–2/3 as long as galea. Capsule symmetrical.

18. *P. interrupta* Steph. ex. Willd. Sp. pl. III (1800) 214; Bge. in Ldb. Fl. Ross. III, 269. Maxim. in Mél. biol. XII, 871, f. 100; Kryl. Fl. Zap. Sib. X, 2494.— *Ic.* Ldb. Ic. pl. fl. Ross. tab. 434.

Perennial. Root vertical, stout, branched. Stems single or few, simple, erect, hard, glabrous, or pubescent above and on inflorescence, distinctly 4-angled in inflorescence, 10–20 cm tall. Radical leaves apparently absent, cauline in 3–5 whorls, lower leaves sometimes opposite, reduced upward and somewhat gradually transformed into bracts, glabrous; lower leaves short-petiolate, upper subsessile, lanceolate, pinnatisect; segments lance-  
 716 olate, spaced, chondroid-pointed, chondroid-lobed or chondroid-dentate, decurrent on axis, latter as a result appearing winged and sometimes dentate. Inflorescence elongated (up to 20 cm), interrupted, somewhat dense only at tip. Middle bracts coriaceous, rhombic-elliptical at base, tapering into chondroid-dentate tip, glabrous, long crispate-hairy only in middle, much shorter than flowers. Calyx coriaceous, campanulate, 10–12 mm long, glabrous or densely long crispate-hairy above, with deltoid, acute, entire or (in lower flowers) sharply chondroid-dentate teeth,  $1/3$ – $1/2$  as long as tube. Corolla pale yellow, almost white, 22–26 mm long tube somewhat curved above calyx throat, galea somewhat falcate in upper half, somewhat shorter than tube, with short beak, sometimes ending below into two very small teeth; lip 3-lobed, small,  $2/3$  as long as galea, middle lobe concave. Stamens with glabrous filaments, or two longer filaments pilose. Capsule 10–15 mm long, subsymmetrical, oblong-lanceolate, gradually tapering into slightly curved beak. Flowering in June. Fruiting in July.

In stony and sandy steppes; sporadic.—*Western Siberia*: Irtysh (south-eastern part); *Soviet Central Asia*: Balkhash Region. Endemic. Described from Siberia. Isotype in Leningrad.

19. *P. platyrrhyncha* Schrenk in Bull. phys.-math. Acad. Sc. Pétersb. I (1842) 79; Bge. in Ldb. Fl. Ross. III, 269; Maxim. in Mél. biol. XII, 871, f. 99.— *Ic.*: Maxim. l.c.

Perennial. Root stout, vertical. Stems 2, simple, erect, densely pubescent, densely long crispate-hairy under and on inflorescence, 13–15 cm tall. Radical leaves apparently rudimentary, cauline in 4 whorls, reduced upward, gradually transforming into bracts, lanceolate, rather long-petiolate, upper leaves sessile, glabrous, lanceolate, pinnatisect; segments spaced, oblong (in lower leaves) and lanceolate (in upper leaves), somewhat decurrent on axis, shortly chondroid-pointed, chondroid-lobed or chondroid-dentate. Inflorescence elongated (apparently about 10 cm long), interrupted. Bracts much shorter than flowers, long crispate-hairy at base and along margin, lower bracts lobed, upper ovate at base, tapering into dentate tip. Calyx coriaceous, campanulate, about 10 mm  
 719 long, long crispate-hairy; teeth dentate, about  $1/2$  as long as tube. Corolla

yellowish (?), about 20 mm long; tube slightly curved above calyx throat; galea falcate in upper half, ending into truncate beak and two small teeth, approximately as long as broad; lip 3-lobed, small, 1/2 as long as galea. Filaments of two stamens pilose. Capsule 10–12 mm long, subsymmetrical, oblong-lanceolate, gradually tapering into slightly curved beak.

Collected once by Schrenk, without indication of the exact place and date of collection. This information is absent also in the initial description of the species. The label of the type says only "749, *Pedicularis platyrrhyncha*, Schr. Songarel. Schrenk".

*Note.* *P. platyrrhyncha* is very close to *P. interrupta* and is distinguished from it by the most insignificant features, the constancy of which, moreover, could not be verified due to inadequate material.

In 1926, Abolin collected plants extremely similar to this species in Buamskoe Ravine (Central bridge. Gypsiferous multicolored sands). However, it is impossible to decide on the basis of available material whether it belongs to this species or to the other, also extremely similar species, *P. chorgossica* Rgl. and Winkl. [Tr. Peterb. bot. sada 6 (1880) 350] known so far from Kuldzha. In the original description of *P. chorgossica*, Regel and Winkler omit the color of its flowers. On one of the isotypes, however, Albert Regel himself from whose collections this species was described, had written "fl. lilacinocoeruleis v. rubris". This, however, is not field entry, but is made later on the herbarium label. Some of the authentic specimens, even in the dried conditions, raise doubts about correctness of Regel's entry. Schrenk indicates white flowers for *P. platyrrhyncha*, while Bunge indicates whitish yellow ('albido-straminea') ones. The growing conditions of *P. platyrrhyncha* and *P. chorgossica* are not clear. Fresh collections are needed in order to clarify this question. It is very possible that Schrenk collected his species in the multicolored sands of the Chuilisk Mountains, which he reached. The collections of Schrenk, Regel and Abolin belong to one species, close to *P. interrupta*, but quite distinct from it.

Series 8. *Pycnanthae* Vved.—Root vertical, stout. Leaf segments decurrent on axis. Galea without beak or with rudimentary beak. Corolla tube curved usually above middle. Capsule symmetrical.

20. *P. pycnantha* Boiss. Diagn. pl. or. nov. I, 12 (1853) 45; Fl. or. IV, 484; Maxim. in Mém. biol. XII, 895, f. 127 (excl. syn. *P. olgae* and spec. himal.).—*lc.*: Maxim. *lc.*

Perennial. Root vertical, hard, branched. Stems 1-several, simple, 720 erect or often ascending or partially ascending, finely long crispate-hairy, sometimes almost villous, (3)5–10(15) cm tall. Radical leaves with petiole several times shorter than lamina; lamina finely long,





crispate-hairy, sometimes almost villous, lanceolate, tapering above, pinnatisect; segments lanceolate, tapering above, incise-lobed, chondroid-pointed, decurrent on axis, latter as a result incise-dentate; lobes of segments often chondroid-dentate, chondroid-pointed; cauline leaves in 2-3 whorls, lower often opposite, short-petiolate, upper sessile, otherwise similar. Lower flowers short-pedicellate, in very dense, usually somewhat elongated, many-flowered inflorescence. Bracts lanceolate, chondroid-serrate at tip, densely, finely long crispate-hairy, shorter than flowers. Calyx campanulate, 10-11 mm long, slightly inflated and accrescent in fruit (up to 18 mm), finely long crispate-hairy; teeth narrowly deltoid, very acute, sometimes serrated,  $2/3$  as long as tube. Corolla pink or white (albinos?), 16-18 mm long, tube somewhat falcate; galea somewhat reclinate, slightly curved, without teeth and beak, 2 times as long as lip; lip 3-lobed, small, about 4 mm long, middle lobe orbicular or broadly transversely elliptical. Filaments of two stamens pilose. Capsule 10-13 mm long, subsymmetrical, broadly ovate, with curved beak. Flowering from May to July. Fruiting from May to August.

On clayey and clayey-stony slopes in middle and upper-mountain zones.—*Soviet Central Asia*: mountainous Turkmenia (Kopet-Dag). *General distribution*: Iran. Described from Tochal Mountain (Elburz). Isotype in Leningrad.

*Note*. Plants from the classic locality are distinguished by a scarcely accrescent calyx, the capsule thus markedly exerted from the calyx. However, the material available from Iran is not adequate to decide whether the Kopet-Dag plant is a separate species.

21. *P. olgae* Rgl. in Izv. Obshch. lyub. estestv. antrop. i etn. 34, 2 (1882) 61.—*P. pycnantha* auct. fl. As. Med.

Perennial. Plant somewhat, arachnoid-villous. Root vertical, stout, branched. Stems 1-several, erect or ascending at base, simple, usually thickset, scaly at base, 10-30 mm tall. Radical leaves (often absent) short-petiolate, oblong-lanceolate or lanceolate, with broadly winged, sometimes dentate axis, pinnatisect; segments lanceolate or oblong, very acute, sharply pinnatifid, chondroid-pointed, decurrent on axis; cauline leaves opposite or whorled, with shorter petioles, otherwise similar. Inflorescence (even in fruit) very dense, 3-10 cm long. Bracts lanceolate

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Plate XXXVI.

1. *Pedicularis peduncularis* M. Pop. general appearance of plant, calyx, corolla, leaf.—2. *P. proboscidea* Stev. general appearance of plant, flower, part of leaf.—3. *P. verae* Vved., general appearance of plant, flower, part of leaf.

or oblong-lanceolate, acute, entire, only lowermost somewhat chondroid-dentate at tip. Calyx 11–12 mm long, campanulate, inflated in fruit, sometimes up to 20 mm long, membranous, with 10 herbaceous veins; teeth subequal, deltoid, entire,  $1/2$ – $2/3$  as long as tube. Corolla pale pink, turning green, 16–20 mm long, tube slightly curved in calyx, slightly exceeding calyx or not; galea almost nasute, scarcely falcate, rounded at tip, 1.5–2 times as long as lip; lip serrated, 3-lobed, middle lobe orbicular. Filaments of two stamens somewhat villous. Capsule oblong-lanceolate, oblong or sub-orbicular, 8–15 mm long, with curved beak. Flowering from April to June. Fruiting from May to July.

On stony and clayey-stony slopes in middle and high-mountain zones.—*Soviet Central Asia*: Tien Shan, Pamiro-Alai. Endemic. Described from Aksai Mountain and Dzhidzhik-Rud Ravine. Type in Tashkent.

*Note.* A highly polymorphic species, undoubtedly deserving subdivision into elementary units. The typical form has an intensely inflated calyx in the fruit and narrow (oblong-lanceolate or oblong), tapering, comparatively thin-walled capsules. Two forms deserve attention: first, the form widely distributed in the upper zone of the western Tien Shan and Pamir-Alai with a suborbicular comparatively thick-walled capsule; second, the form of the western Pamir with similar capsules, but with less dissected leaves and a corolla tube markedly exerted from the calyx. Apparently, the latter is described by Prain [Prain in Ann. Bot. Gard. Calcutta 3 (1890) tab. 28 B] under the name *P. pycnantha*. These three forms do not cover the diversity of *P. olgae* s.l. Well-collected material with field notes on the color pattern of the flowers is essential.

22. *P. amoeniflora* Vved. sp. nov. in Addenda XXI, 810.

Perennial. Root stout, branched, often multiheaded. Stem simple, erect or ascending, rather thick, glabrous, long crispate-hairy under inflorescence, 5–15 cm tall. Radical leaves absent; cauline leaves in 2(3) whorls, lower opposite, upper whorled, with petioles shorter than lamina; lamina glabrous or diffusely arachnoid-pilose, lanceolate, pinnatisect or pinnatipartite; segments deltoid-oblong or deltoid-lanceolate, acute, unequally sharply lobed or coarsely toothed, decurrent on dentate axis. Inflorescence many-flowered, very compact, elongated, rarely slightly reduced. Bracts lanceolate, entire or serrate at tip, almost arachnoid-ciliate, much shorter than flowers. Calyx broadly campanulate, 10–12 mm long, subglabrous; teeth deltoid, very acute, entire, almost arachnoid-ciliate,  $1/2$  as long as tube. Corolla pink, 20 mm long; tube curved near calyx throat at right angle or almost so; galea somewhat reclinate, slightly falcate, sometimes with very obtuse, scarcely discernible tooth under tip; lip 3-lobed, small  $2/3$  as long as galea, 5–6 mm long. Filaments of two stamens pilose. Flowering in June.



On stony-clayey slopes in high-mountain zone (cousinia-sagebrush steppe). *Soviet Central Asia*: Pamiro-Alai (Bogush-Dara River). Endemic. Described from Bidzhunt Pass. Type in Leningrad.

23. *P. pulchra* Pauls. in Bot. Tidsskr. XXVII (1906) 211, f. 1.—*l.c.*: Pauls, l.c.

Perennial. Root vertical, thickened, usually branched, sometimes with thickened fibers. Stem often almost undeveloped or 2–6 cm tall, glabrous or long crispate-hairy on inflorescence, scaly at base. Radical leaves absent, cauline opposite or whorled, short-petiolate with isolated crispate hairs or rather densely long crispate-hairy, linear-lanceolate, with winged dentate axis, pinnatisect; segments oblong or lanceolate-deltoid, decurrent, pinnately lobed or coarsely toothed, very acute; lobes and teeth of segments finely, shortly chondroid-tipped. Inflorescence capitate or often interrupted, lower flowers usually distant and with long (up to 20 mm) pedicels. Lowermost bracts leaflike or linear, unequally sharply notched, middle bracts linear with serrate tip, upper entire. Calyx tubular-campanulate, 10–13 mm long, up to 16 mm in lowermost flowers, slightly inflated in fruit, membranous, with prominent crispate-hairy veins, not forming reticulum; teeth herbaceous (more developed in lowermost flowers), chondroid-pointed, subentire, lanceolate-spatulate,  $1/2$  as long as tube. Corolla pinkish violet or white, 25–30 mm long; tube somewhat curved above calyx throat; galea erect, slightly curved at tip, very shortly bidentate in front with obtuse teeth,  $2/3$  as long as tube; lip sub-reniform,  $7-8 \times 8-10$  mm, 3-lobed, with suborbicular, 2.5–4 mm broad middle lobe. Filaments of two stamens pilose. Capsule ovate or broadly elliptical, with straight beak, shorter than calyx (8–12 mm long). Flowering from May to August. Fruiting from June to September.

On stony and rubbly slopes of high-mountain zone.—*Soviet Central Asia*: Pamiro-Alai (western Pamir). Endemic. Described from Yashil-Kul Lake. Isotype in Leningrad.

723 24. *P. verae* Vved. sp. nov. in Adden a XXI, 810.—*P. zeravschanica* auct. fl. As. Med. p.p.

Perennial. Root stout, usually multiheaded, neck covered with remnants of dead stems and rudimentary radical leaves. Stem often almost undeveloped, up to 3 cm tall, simple, glabrous, sometimes long crispate-hairy or almost villous on inflorescence. Radical leaves absent, cauline opposite or whorled, short-petiolate, finely, sparsely arachnoid-villous, later glabrescent, linear-lanceolate, pinnatisect or deeply pinnatipartite; segments lanceolate or deltoid-oblong, spaced in lower part, closer in less dissected upper part, acute, sharply chondroid-serrate or almost lobed, decurrent, axis as a result dentate. Inflorescence capitate or often much interrupted in

lower part, arachnoid-villous. Lowermost bracts leaflike, middle lanceolate, tapering, entire or serrate at tip, shorter than flowers. Pedicels up to 10 mm long, upper flowers sessile. Calyx campanulate, 10–12 mm long, somewhat arachnoid-villous; teeth deltoid-linear, very acute, entire or serrate,  $2/3$  as long as tube. Corolla apparently yellow, 22–24 mm long; tube scarcely curved, almost erect; galea slightly reclinate, erect, truncate in front, without teeth or beak,  $1/2$  as long as tube; lip small, 3-lobed, slightly shorter than galea. Filaments of two stamens pilose-villous. Capsule 8–10 mm long, elliptical, with hooked beak. Flowering from June to August. Fruiting from July to September (Plate XXXVI, fig. 3).

On stony and clayey slopes in high-mountain zone.—*Soviet Central Asia*: Pamiro-Alai [Yagnob. Sardai-Miona, Kugi-Frush (?)]. Endemic. Described from upper reaches of Sardai-Miona River. Type in Leningrad.

*Note.* Plants from Kugi-Frush Mountain are distinguished by more deeply dissected leaves. The flowers, however, are yellow (collector's note).

Series 9. *Zeravschanicae* Vved.—Root vertical, comparatively stout. Stem almost undeveloped. Leaf segments decurrent on axis. Galea hamate at tip, with two recurved teeth. Corolla tube erect or suberect.

25. *P. zeravschanica* Rgl. in Izv. Obshch. lyub. estestv. antrop. i etn. 34, 2 (1882) 61; Maxim. in Mém. biol. XII, 903, f. 144.—*lc.*: Maxim. *l.c.*

724 Perennial. Root virgate, thick, branched near tip. Stem single, 1–2(3) cm tall, with long crispate hairs on inflorescence. Radical leaves absent, cauline whorled, lower leaves opposite, short-petiolate, with long crispate hairs, lanceolate or lanceolate-linear in shape, pinnatisect, with unequally dentate axis; segments oblong-lanceolate, with large, sharp, chondroid teeth or lobes, decurrent, lower segments spaced, upper closer. Inflorescence capitate, sometimes markedly interrupted, especially in lower part. Lowermost bracts leaflike, middle lanceolate or oblong at base, long tapering, entire or serrate at tip, long crispate-hairy, shorter than flowers. Pedicels up to 15 mm long, upper flowers sessile. Calyx subglabrous or long crispate-hairy, tubular-campanulate, 9–10 mm long; teeth deltoid at base, elongated-linear, very sharp, entire or sparsely finely toothed, at least  $1/2$  as long as tube. Corolla (25)30(35) mm long, yellowish with purple lip; tube erect or suberect; galea slightly reclinate, suberect, slightly curved at tip, with short, recurved beak ending into two recurved sharp teeth; lip 3-lobed,  $2/3$  as long as galea. Stamens with glabrous filaments. Flowering from May to July.

On slopes in high-mountain zone.—*Soviet Central Asia*: Pamiro-Alai. (Hissar Range). Endemic. Described from Iskander-Kul. Type in Tashkent.

26. *P. inconspicua* Vved. sp. nov. in Addenda XXI, 811.—*P. zeravschanica* auct. fl. As. Med. p.p.

Perennial. Root virgate, thickened, branched near tip. Stem simple, 1–2(5) cm tall, glabrous or long crispate-hairy on inflorescence. Radical leaves absent, cauline whorled or (lower) opposite, glabrous or with isolated crispate hairs, with petioles equaling or shorter than lamina; lamina lanceolate, pinnatisect, with unequally dentate axis; segments oblong or lanceolate, acute, deeply lobed; lobes of segments acute, chondroid-pointed. Inflorescence capitate, sometimes markedly interrupted, especially in lower part. Lowermost bracts sometimes leaflike, middle oblong or lanceolate at base, long tapering, serrate at tip or entire, shorter than flowers, long crispate-hairy, especially in lower part. Pedicels up to 8 mm long, upper flowers sessile. Calyx 10–13 mm long, subglabrous or long crispate-hairy, especially on teeth, tubular-campanulate, slightly inflated and accrescent in fruit; teeth deltoid-linear, very sharp, entire, slightly shorter than or  $2/3$  as long as tube. Corolla pinkish yellow, single-colored, plain, 24–28 mm long; tube erect or suberect, slightly reclinate, curved at tip, with short, recurved beak, ending into two recurved sharp teeth; galea at least  $1/2$  as long as tube; lip small, 3-lobed, at least  $2/3$  as long as galea. Stamens with glabrous filaments. Capsule elliptical, with slightly oblique, slightly hooked beak, 10–13 mm long. Flowering from June to July. Fruiting from July to August.

On clayey-stony and rubbly damp slopes in high-mountain zone.—*Soviet Central Asia*: Pamiro-Alai (western part of Hissar Range. Khodzha-Gurgur, Chulbair Kugitang). Endemic. Described from Chulbair, Mountains. Type in Tashkent.

Series 10. *Semenovianae* Vved.—Root fleshy, comparatively short, with thickened fibers or clustered, with fusiform or thick fibers. Stem almost undeveloped, or developed, but weak, though thick. Galea erect or slightly smoothly curved, without or with short beak, sometimes with teeth. Corolla tube smoothly falcate or erect. Capsule asymmetrical.

27. *P. semenovii* Rgl. in Bull. Soc. Nat. Mosc. XLI, 1 (1868) 108; Maxim in Mém. biol. XII, 894, f. 129.—*P. pycnantha* var. *semenovii* Prain in Ann. Bot. Gard. Calc. III (1890) 180 (quoad pl. As. Med.)— *Ic.*: Maxim. l.c.

Perennial. Root stout, comparatively short, fleshy with fusiform thickened branches. Stems 1-several, simple, often weak, long crispate-hairy, villous under inflorescence, 2–5(10) cm tall. Radical leaves absent, lower cauline leaves reduced, middle opposite, upper whorled, long crispate-hairy, linear-lanceolate, deeply pinnatipartite; lobes somewhat spaced in lower part, closer above, oblong, subobtusate, pinnately lobed, not decurrent, with short chondroid tips; lobules sparsely dentate, chondroid-pointed,



similarly to teeth; middle leaves sometimes almost villous, sometimes slightly exceeding lamina, upper leaves subsessile. Flowers in capitate, sometimes many-flowered inflorescence, lowermost often distant, on up to 15 mm long pedicels. Lowermost bracts often leaflike, middle linear or linear-lanceolate, sometimes densely long crispate-hairy, chondroid-serrulate at tip, shorter than flowers. Calyx 10–17 mm long, campanulate, accrescent in fruit, slightly inflated, membranous, long crispate-hairy along prominent herbaceous veins; teeth linear, acute, usually serrulate,  $2/3$  as long as tube. Corolla purplish pink or white with purplish pink lip, 22–30 mm long; tube slightly falcate; galea slightly curved, without beak and teeth; lip broad, 3-lobed, equaling or scarcely exceeding galea, 7–10 mm long. Filaments of two stamens pilose. Capsule 12–15 mm long, obliquely ovate, with erect beak, enclosed in calyx. Flowering from May to June. Fruiting from June to July.

On clayey and stony slopes in high-mountain zone.—*Soviet Central Asia*: Dzh.-Tarbagatai, (Dzhungar–Ala-Tau), Tien Shan (Central Tien Shan), Pamiro-Alai (Pamir: Chechekty, Pshart, Karasu). Endemic (?). Described from Bayan-Dzhuruk Mountain (Dzhungar–Ala-Tau).

*Note.* A plant very similar to this species was collected by Nikitina on 12 April 1929 in the vicinity of Frunze, on the first rock benches opposite the city, on the northern slope. The nonconformity with the usual habitat, as also some differences in the flower structure, namely, the galea truncated in front in the horizontal line, compels us to withhold final determination of this plant until more extensive material is available. The collector notes that the flowers are “white with pink”.

About plants from the Alai range, see note under *P. popovii* m.

28. *P. popovii* Vved. sp. nov. in Addenda XXI, 812.

Perennial. Root reduced, with funiform thickened fibers. Stems 1–3, weak, partially ascending, sometimes suberect, densely long crispate-hairy, almost villous, 5–10 cm tall. Radical leaves with petioles equaling or shorter than lamina; lamina long crispate-hairy, lanceolate, pinnatisect; segments oblong, slightly tapering above, pinnately lobed, with tapering chondroid-pointed sparsely dentate lobes, slightly decurrent on axis or not; cauline leaves in whorls of 2–4, on shorter petioles, less dissected. Inflorescence compact, spicate, 2–6 cm long. Bracts oblong, acuminate, lower bracts dentate at tip. Calyx on up to 6 mm long pedicel, broadly campanulate at flowering stage, 11–14 mm long, later somewhat inflated, up to 18 mm long, membranous, with 10 herbaceous veins and unequal herbaceous teeth; upper tooth shorter, deltoid, others  $1/2$  as long as tube, deltoid at base, linear, chondroid-pointed, entire. Corolla apparently pinkish purple, with dark purple lip, 18–24 mm long, glabrous; tube falcate, galea erect, horizontally truncate in front, without teeth, 6–7 mm long,

slightly longer than or 1.5 times as long lip; lip small, 5–6 mm broad, 3-lobed, serrate, with elongated middle lobe. Stamen with labrous filaments or two of them pilose. Capsule 9–10 mm long, obliquely broadly ovate, almost semiorbicular, with short, straight beak pointing laterally. Flowering in May. Fruiting in June.

On stony, clayey slopes in middle and high-mountain zones.—*Soviet Central Asia*: Pamiro-Alai (Alai Range, Sarytau, Turkestan Range). Endemic. Described from Sarytau Mountain. Type in Tashkent.

727 *Note*. Plants from the Alai range are distinguished by stamens with pilose filaments. Some plants, for example, from Chartash (Knorring), are even closer to *P. semenovii*, with a larger lip and the absence sometimes of radical leaves. Possibly, these are hybrids between the two species, but final judgment is not possible without adequate material.

29. *P. karatavica* Pavl. in Vestn. Akad. Nauk. KazSSR, 3 (1950) 33.

Perennial. Root fascicular, fibers almost fusiform thickened. Stems 1–2, simple, rather thick, weak, glabrous below, densely long crispate-hairy, often villous above, 3–7 cm tall. Radical leaves absent; cauline leaves in 2–3 whorls (lower often opposite), with densely long crispate-hairy, often villous petioles, equaling or shorter than lamina; lamina linear-lanceolate, pinnatisect; segments somewhat spaced, broadly oblong, chondroid-pointed, deeply pinnately lobed or parted, lobes chondroid-pointed, sparsely chondroid-dentate. Lower flowers on up to 5 mm long pedicels, in comparatively few-flowered, capitate, or often somewhat elongated inflorescence, interrupted in lower part. Bracts oblong-lanceolate, long crispate-hairy, tapering above into chondroid-serrated tip, much shorter than flowers. Calyx campanulate, 13–18 mm long, slightly inflated in fruit, membranous, with prominent herbaceous veins, long crispate-hairy; teeth narrowly membranous, herbaceous at tip, very acute, serrate, 2/3 as long as tube. Corolla pale pink, with pinkish purple lip, 28–32 mm long; tube slightly falcate, galea scarcely reclinate, smoothly curved at tip, with short beak ending into two deltoid, almost recurved teeth, at least 1/2 as long as tube; lip large, 3-lobed, slightly shorter than galea. Filaments of two stamens pilose. Capsule 10–14 mm long, obliquely broadly ovate, with erect beak. Flowering in May. Fruiting in June.

On stony and rubbly slopes in upper mountain zone (about 1200 m).—*Soviet Central Asia*: Tien Shan (Karatau). Endemic. Described from Karatau (Minzhelke). Type in Moscow.

30. *P. waldheimii* Bonati in Bull. Soc. Bot. France, 61 (1914) 292, tab. VI.—*l.c.*: Bonati, l.c.

Perennial. Plant subcaulescent, subglabrous. Root fibrous, with thickened fibers. Stem 1–2 cm tall. Radical leaves absent, cauline whorled, long-petiolate, lanceolate or linear-lanceolate, pinnatipartite; lobes oblong,

- 728 sharply chondroid-toothed, sometimes pinnatipartite, spaced. Inflorescence compact, capitate. Bracts similar to leaves, but reduced and less dissected. Pedicels 10–15 mm long, with isolated crispate hairs. Calyx glabrous or with isolated crispate hairs, 15–18 mm long, slightly membranous, with 10 herbaceous veins; teeth broadened at tip, sharply chondroid-dentate,  $2/3$  as long as tube. Corolla white, 30–45 mm long; tube erect, 1.5 times as long as galea; galea slightly falcate, rounded at tip, slightly beaked in front, with two projecting and slightly recurved, narrowly deltoid teeth under tip; lip large, 3-lobed, scarcely longer than galea. Stamens with pilose filaments. Capsule 10–12 mm long, almost semiorbicular, with erect beak. Flowering from May to June. Fruiting from June to July.

On debris in high-altitude zone.—*Soviet Central Asia*: Pamiro-Alai (Alai and Turkestan ranges). Endemic. Described from several places in western part of Alai Range. Type in Leningrad.

31. *P. maximowiczii* Krassn. in Script. Hort. Univ. Petrop. II. (1889) 18; Maxim. in Mél. biol. XII, 913, f. 164.

Perennial. Root fibers thickened. Stem glabrous, short, long-branched from base, branches ascending, alternate and opposite. Radical leaves with long, slender petioles, very diffusely long crispate-hairy; lamina lanceolate, pinnatisect; segments spaced, oblong, incise-pinnatipartite; cauline leaves with shorter petioles. Flowers 1(3) on short pedicels on branch tips and (2)3 on very long pedicels on stem tips. Bracts leaflike, only less dissected and with short, broadened, more densely pilose petioles. Calyx campanulate, membranous, sparsely long crispate-hairy, 12–15 mm long, with herbaceous, deltoid, acute, dentate teeth,  $2/3$  as long as tube. Corolla white, 30–35 mm long; galea suberect or slightly falcate, approximately equaling suberect tube, sometimes with two scarcely discernible teeth under tip; lip broad, 3-lobed, reflexed, equaling galea or slightly shorter. Filaments of two stamens pilose. Flowering from June to August.

Alpine rubbly slopes.—*Soviet Central Asia*: Tien Shan (central). Endemic. Initial description omits original location. Maximowicz, who had only authentic material available to him, cites Muzart and Tekes. Type in Leningrad.

Series 11. *Myriophyllae* Vved.—Annuals. Leaves pinnatisect; segments pinnately lobed or deeply pinnatipartite. Lip equaling galea or slightly shorter.

- 729 32. *P. myriophylla* Pall. Reise, III (1776) 737, tab. S, f. 1; Bge. in Ldb. Fl. Ross. III, 274; Turcz. in Bull. Soc. Nat. Mosc. XXIV, 2, 328 (quoad var.  $\alpha$ ); Maxim. in Mél. biol. XII, 858, f. 174; Kryl. Fl. Zap. Sib. X, 2500.—*lc.*: Pall. *l.c.*



Annual. Stem branched from base or rarely simple, almost 4-angled, crispate-hairy along angles or ribs, or subglabrous, usually purple, several times exceeding radical leaves, (5)10–40 cm tall. Radical leaves with crispate-hairy or subglabrous petioles shorter than lamina; lamina glabrous or subglabrous, lanceolate, pinnatisect; segments lanceolate, spaced, chondroid-pointed, deeply regularly spaced pinnatipartite; lobes chondroid-pointed, with regularly spaced chondroid-pointed teeth; cauline leaves in 3–9 whorls, with very short petioles or upper leaves sessile, with longer segments, reduced upward, gradually transforming into bracts, otherwise similar. Inflorescence capitate or usually elongated, interrupted in lower part, subglabrous. Bracts broadened and long crispate-hairy at base, pinnatisect, with lobed or dentate segments, shorter than pedicels, except lowermost bracts. Calyx broadly campanulate, slightly inflated, membranous, glabrous or long crispate-hairy above along prominent veins, 9–13 mm long; teeth deltoid, acute, entire or serrate, long crispate-hairy,  $2/5$ – $1/2$  as long as tube. Corolla light yellow, with reddish (always ?) veins, 17–20 mm long, curved at obtuse angle in calyx throat; galea slightly concave dorsally, somewhat curved at tip and gradually transforming into short beak; lip 3-lobed, broad, scarcely shorter than galea. Filaments of two stamens pilose. Capsule obliquely oblong-lanceolate, 10–15 mm long. Flowering from July to August. Fruiting in August.

Ruderal plant in meadows, open forests.—*Western Siberia*: Altai Mountains; *Eastern Siberia*: Angara-Sayan, Dauria. *General distribution*: Mongolia. Described from several places in Siberia. Isotype in Leningrad.

33. *P. ludwigii* Rgl. in Bull. Soc. Nat. Mosc. XLI, 1 (1868) 107.—*P. leptorhiza* Rupr. in Mém. Acad. Sc. Pétersb. VII sér. XIV, 4 (1869) 62; Maxim. in Mém. biol. XII, 864, f. 92.—*P. abrotanifolia* var. *longiflora* Rgl. in AHP, 6 (1880) 348.—*P. abrotanifolia* auct. fl. As. Med.—*lc.*: Maxim. l.c.

730 Annual. Stem branched from base or middle, rarely simple, almost 4-angled, shining, several times exceeding radical leaves, (5)10–40 cm tall. Radical leaves with crispate-ciliate petioles,  $1/2$  as long as lamina; lamina glabrous or with isolated crispate hairs, oblong-lanceolate, pinnatisect; segments oblong-lanceolate, chondroid-pointed, spaced, slightly decurrent, pinnately lobed, lobes chondroid-pointed, chondroid-dentate, with slightly recurved teeth; cauline leaves in 2–3 whorls of 2–5 leaves, with shorter petioles or upper leaves subsessile, reduced upward, with longer lanceolate segments, otherwise similar. Inflorescence elongated (up to 25 cm), dense, interrupted in lower part, finely crispate-villous. Lowermost bracts similar to upper leaves, exceeding flowers, middle bracts longer than calyx, with subrhombic, finely crispate-villous base, tapering into lanceolate, cristate-lobed, chondroid-pointed, glabrous tip with involute margin; lobes of tip chondroid-pointed, chondroid-dentate, upper lobes rhombic in shape, with

slightly tapering chondroid-dentate or entire glabrous tip. Calyx tubular, 6–12 mm long, membranous, with 10 finely villous veins, unequally 5-toothed; lateral teeth up to 3 mm long, ovate with deltoid base, chondroid-pointed, chondroid-dentate, involute along margin, finely villous-ciliate or (in upper flowers) deltoid, entire, upper tooth short, deltoid, entire. Corolla light yellow, 15–25 mm long, curved at obtuse angle at base of throat; tube erect, 11–20 mm long; galea short-beaked, slightly concave dorsally, slightly exceeding lip; lip 3-lobed, serrate, 5–6 mm long, 9–11 mm broad. Filaments of two stamens pilose. Capsule ovate, with oblique beak, slightly exceeding calyx. Flowering from July to August. Fruiting from August to September.

On clayey and stony slopes in high-altitude zone.—*Soviet Central Asia*: Dzh.-Tarbagatai, Tien Shan, Pamiro-Alai (eastern part). *General distribution*: Kashgar. Described from Keisy-Karachai Pass (Dzhungar-Ala-Tau). Type in Leningrad.

*Note*. According to an oral communication from M. G. Popov, a plant collected along the Babakansu River (Talas Ala-Tau) had white flowers. This habitat is in the extreme west of the Tien Shan, and somewhat isolated from other regions. Further observations in this region should be interesting.

34. *P. abrotanifolia* M.B. ex Stev. in Mém. Soc. Nat. Mosc. VI (1823) 22, tab. 5, f. 1; Bge. in Ldb. Fl. Ross. III, 273; Turcz. in Bull. Soc. Nat. Mosc. XXIV, 2, 329; Maxim. in Mém. biol. XII, 879, f. 104 (excl. specim. songar. and uralen.); Kryl. Fl. Zap. Sib. X, 2498.—*Icon*: Ldb. Ic. pl. fl. Ross. tab. 278.

731 Annual. Stem simple or branched at base, almost 4-angled, crispate-hairy along angles, shining, several times exceeding radical leaves, 5–20(40) cm tall. Radical leaves with diffusely crispate-ciliate petioles, approximately equaling lamina; lamina glabrous, lanceolate pinnatisect; segments lanceolate, chondroid-pointed, spaced, pinnately villous; lobes of segments chondroid-pointed, chondroid-dentate; cauline leaves in 2–4 whorls, with shorter petioles or upper leaves sessile, reduced upward, with longer, linear-lanceolate segments, otherwise similar. Inflorescence elongated (up to 20 cm), interrupted in lower part, rarely subcapitate, subglabrous or densely crispate-hairy. Lowermost bracts leaflike, exceeding flowers, middle bracts subovate, tapering and sometimes chondroid-dentate at tip, crispate-hairy, equaling or slightly exceeding calyx. Calyx tubular, 8–11 mm long, membranous, subglabrous or somewhat densely long crispate-hairy along veins; teeth deltoid, entire or often broadly spatulate, chondroid-dentate, 1/3 as long as tube. Corolla light yellow, 15–28 mm long, curved at obtuse angle at limb base, with erect, 9–17 mm long tube; galea without or with very short beak, erect or scarcely concave dorsally, equaling or slightly exceeding

lip; lip 3-lobed, serrate. Stamens with glabrous filaments. Capsule obliquely oblong, sometimes with recurved beak, slightly exceeding calyx. Flowering from June to July. Fruiting from July to August.

On dry, sometimes stony slopes, in grassy, sometimes damp meadows. —*Western Siberia*: Altai. *General distribution*: Mongolia. Described from Altai. Type in Leningrad.

*Note*. Maximowicz (l.c.) described two varieties of this species: var. *altaica* and var. *mongolica*, which apparently coincide with the var. *typica* and var. *glabrescens*, described earlier by Bunge (Ldb. Fl. alt. 2, 426). They are distinguished by the corolla tube size of the lip and its length in relation to the galea. The typical plant has a corolla tube up to two times longer than the calyx and a large lip, up to 12 mm broad and equaling the galea. With respect to an ecological differentiation in this species in the Altai, the taxonomic significance of these forms should be verified in nature on the basis of extensive material.

Series 12. *Spicatae* Vved.—Annuals. Leaves sinuate, pinnatipartite or deeply pinnately lobed; parts crenulate. Lip almost 2 times as long as galea.

35. *P. spicata* Pall. Reise, III (1776) 738, tab. S, f. 2; Bge. in Ldb. Fl. Ross. III, 271; Turcz. in Bull. Soc. Nat. Mosc. XXIV, 2, 330; Maxim. in Mém. biol. XII, 886, f. 117.—*lc.*: Rgl. in Sert. Petrop. tab. 30.—*Exs.*: Karo, Pl. Dahur. No. 378; Pl. Amur. and Zean. No. 64.

732 Annual. Stem erect, simple, branched from base or middle, angular, diffusely crispate-hairy or with 4 somewhat distinct crispate-hairy lines, 15–70 cm tall. Radical leaves in rosette, rather small, petiolate, crispate-hairy, deeply pinnatipartite; lobes elliptical-oblong, connivent, chondroid-dentate; cauline leaves in 3–5 very distant whorls, enlarged toward middle of stem, reduced thereafter; middle cauline short-petiolate, linear-lanceolate, sinuate-pinnatipartite or deeply sinuate pinnatilobate; lobes projecting, obtuse, deltoid-oblong or semiorbicular-oblong, chondroid-crenulate; upper leaves sublinear, pinnately lobed or doubly serrate, sessile. Flowers in compact capitate or elongated, densely crispate-hairy, spicate inflorescence at stem and branch tips. Lowermost bracts leaflike, middle and upper deltoid-ovate, slightly cordate at base, subobtuse, exceeding calyx, crispate-hairy, chondroid-crenulate. Calyx 3–4 mm long, broadly campanulate, slightly inflated, membranous, with herbaceous, crispate-hairy veins, with broadly deltoid short teeth. Corolla bright purple, 12–15 mm long; tube curved near calyx throat; galea reclinate, scarcely falcate, without teeth; lip very broad, 3-lobed, almost 2 times as long as galea, 7–8 mm long. Filaments of two stamens pilose. Capsule obliquely oblong-lanceolate, with recurved tip, 6–7 mm long. Flowering from July to August. Fruiting in August (Plate XXXVII, fig. 4).





In meadows, sometimes marshes, among scrub.—*Eastern Siberia*: Angara-Sayan (eastern part), Dauria;—*Soviet Far East*: Zeya-Bureya, Ussuri. *General distribution*: Mongolia, China, Korea. Described from Dauria.

Section 3. *Rhyncholopha* Bge. in Ldb. Fl. Ross. III (1847–1849) 268.—Leaves alternate or (*P. kuznetzovii*) opposite. Galea with somewhat elongated beak, sometimes with teeth under tip, but without tooth above throat.

Series 1. *Axillares* Vved.—Rootstock slender, creeping. Leaves opposite. Galea curved above at right angle and tapering into rather long beak.

36. *P. kuznetzovii* Kom. in Fedde, Repert. sp. nov. IX (1911) 391.—*Exs.*: Herb. Fl. Ross. No. 2365.

735 Perennial. Rootstock slender, creeping, rooting at nodes, bearing single, very rarely two stems. Stem erect, rarely simple (due to damaged tip?), branched, slender, delicate, with two lines of fine crispate hairs, leafless in lower part, 10–20 cm tall. Radical leaves absent, cauline opposite, gradually reduced upward, short-petiolate, diffusely pubescent above along axis, oblong, pinnatisect; segments oblong-ovate, very distant, narrowed toward base, subsessile, deeply pinnately lobed; lobes projecting, obliquely deltoid, sharply chondroid-pointed, unilateral, sharply chondroid-serrate. Flowers on short pedicels, solitary in axils of spaced upper leaves. Calyx 5–6 mm long, scarious, glabrous, with purple spots, with 3 herbaceous veins, more than 1/2 cleft in front, bidentate, with very short, sparsely ciliate teeth. Corolla 15–17 mm long, erect; tube slightly curved at base, pilose outside, slightly shorter than galea; galea curved above at right angle, tapering into long, straight, truncate and serrate beak; lip shortly clawlike, ovate, ciliate, 3-lobed, with small lanceolate middle lobe, slightly longer than galea. Stamens with glabrous filaments. Capsule subsymmetrical, linear-lanceolate, long and gradually tapering into short straight beak, horizontally diverging, 12–13 mm long. Flowering from June to July. Fruiting from July to August (Plate XXXVII, fig. 3).

In damp forests.—*Soviet Far East*: Uda Region (?), Ussuri. Endemic. Described from valley of Kur River. Type in Leningrad.

Series 2. *Lapponicae* Vved.—Rootstock slender, creeping. Leaves alternate, pinnatisect. Galea with short beak, glabrous in front.

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Plate XXXVII.

1. *Pedicularis pubiflora* Vved., general appearance of plant, flower, leaf.—2. *P. alata* Vved., leaf.—3. *P. kuznetzovii* Kom., general appearance of plant, flower, leaf.—4. *P. spicata* Pall., general appearance of plant, flower, leaf.

37. *P. lapponica* L. Sp. pl. (1753) 609; Bge. in Ldb. Fl. Ross. III, 281; Turcz. in Bull. Soc. Nat. Mosc. XXIV, 2, 346; Maxim. in Mém. biol. XII, 855, f. 78; Kryl. Fl. Zap. Sib. X, 2505.—*lc.*: Fedtsch. and Fler. Fl. Evrop. Ross., fig. 882.—*Exs.*: Herb. norm. No. 5152.

736 Perennial. Rootstock slender, creeping, rooting at nodes, terminating into flowering stems or sparse leaf clusters. Stems 1(2–3), simple, erect or rarely ascending at base, slender, sparsely puberulent, leafless at base, (5)10(20) cm tall. Radical leaves (of sterile shoots) with glabrous petioles, slightly longer or shorter than lamina; lamina glabrous with narrowly winged axis, lanceolate, pinnatisect; segments oblong, pinnately lobed, lobes of segments acute, 2–3-toothed; lower cauline leaves reduced, middle with slightly broadened short petioles, lanceolate or linear-lanceolate, cristate-pinnatilobate or cristate-pinnatipartite, with finely denticulate lobes, gradually transforming into bracts. Flowers on short pedicels in few-flowered, capitate inflorescence, sometimes interrupted in lower part. Lower bracts equaling flowers or longer, narrowly linear-lanceolate or sublinear, cristate-lobed, with sparsely denticulate lobes or subserrate; middle bracts shorter than flowers, sublinear, serrate in upper half. Calyx subelliptical, 6–7 mm long, almost herbaceous, with prominent finely branched veins, almost 1/2 cleft in front, with 2–4 short deltoid teeth. Corolla white or light yellow (?), 14–16 mm long; tube erect or slightly curved under throat, sometimes puberulent outside, 1/2–2/3 times as long as galea; galea erect, curved above and gradually tapering into short, straight, projecting beak; lip broad, 3-lobed, glabrous or sparsely ciliate, slightly shorter than galea. Filaments of two stamens sparsely pilose. Capsule subsymmetrical, linear-lanceolate or lanceolate, gradually long tapering, very acute, thin-walled, horizontally diverging or somewhat bent downward, 8–14 mm long. Flowering from July to August. Fruiting from August to September.

In mossy tundra, in mountains in alpine zone.—*Arctic Region*: Arctic Europe, Novaya Zemlya, Arctic Siberia, Chukotka, Anadyr; *Eastern Siberia*: Lena-Kolyma, Angara-Sayan (eastern part), Dauria; *Soviet Far East*: Kamchatka, Okhotsk, Chukotka, Sakhalin. *General distribution*: Arctic Europe and eastern part of Arctic North America, Greenland.

Series 3. *Tristes* Vved.—Rootstock slender, creeping. Leaves alternate, incised crenate-lobed. Galea with short beak, villous-ciliate in front.

38. *P. tristis* L. Sp. pl. (1753) 608; Bge. in Ldb. Fl. Ross. III, 302; Turcz. in Bull. Soc. Nat. Mosc. XXIV, 2, 348; Maxim. in Mém. biol. XII, 844, f. 65; Kryl. Fl. Zap. Sib. X, 2525.—*lc.*: Stev. in Mém. Soc. Nat. Mosc. VI, tab. 10, f. 2.

Perennial. Rootstock slender, creeping, rooting under stems, with filiform fibers. Stem usually erect, simple, hard, densely long



crispate-hairy, almost villous, 10–40 cm tall. Radical leaves reduced or almost so, cauline alternate, long crispate-hairy, narrowly linear-lanceolate, sublinear, incised crenate-lobed, with doubly chondroid-dentate lobes, gradually reduced upward; lower leaves narrowed at base, subsessile, middle and upper leaves sessile, semiamplexicaul. Flowers sessile in dense oblong inflorescence. Bracts linear-lanceolate, densely long crispate-hairy, crenate-serrate at tip; lower bracts longer than calyx, middle slightly shorter. Calyx campanulate, almost herbaceous with anastomosed veins, long crispate-hairy, 13–15 mm long, with deltoid subacute teeth, at least  $1/2$  as long as tube. Corolla yellow, 30–32 mm long; tube erect, pilose outside, approximately equaling galea; galea falcate at tip, somewhat diffusely glandular-pubescent dorsally, villous-ciliate in front, 737 short-beaked; lip 3-lobed, with subequal lobes, glabrous, equaling galea. Stamens with glabrous filaments. Capsule 20–25 mm long, oblong, symmetrical, abruptly narrowed into very short beak. Flowering from June to July. Fruiting from July to August.

In damp meadows, in mountains in alpine and subalpine meadows.—*Arctic Region*: Anadyr: *Western Siberia*: Altai; *Eastern Siberia*: Lena-Kolyma, Angara-Sayan. Dauria; *Soviet Far East*: Okhotsk (Ayan): *Soviet Central Asia*: Dzh.-Tarbagatai (?). *General distribution*: Mongolia. Described from Siberia. Type in London.

Series 4. *Resupinatae* Vved.—Root stout, branched. Stem branched. Leaves alternate, entire, incise-crenate or incised serrate-crenate. Beak almost equaling galea.

39. *P. yezoënsis* Maxim. in Mém. biol. X (1877) 106; XII, 832, f. 49.—*lc.*: Tarasaki, Ic. fl. Jap. tab. 944.

Perennial. Root stout, branched. Stems 1-several, branched, erect or somewhat twisted, densely leafy, almost 4-angled, somewhat densely crispate-pubescent, 20–40 cm tall. Radical leaves absent, cauline alternate, short-petiolate, entire, oblong-lanceolate, broadly cuneate at base, incised serrate-crenate, with chondroid-serrulate notches at tip, glabrous above, diffusely crispate-pubescent beneath, gradually reduced upward; uppermost leaves bractlike. Flowers resupinate subsessile, solitary in axils of crowded (sometimes closely), intensely reduced floral leaves at stem and branch tips. Calyx 6–7 mm long, sublanceolate in shape, almost herbaceous, with two prominent anastomosed veins, bilobed, very deeply ( $3/4$ ) cleft in front, glabrous; teeth broadly deltoid, subacute, ciliate along margin. Corolla yellowish, 20–22 mm long; tube slightly curved, pilose outside, at least  $1/2$  as long (including beak) as galea; galea slightly falcate, gradually tapering into long beak almost equaling galea; lip broad, 3-lobed, broadly ovate, ciliate, exceeding galea including beak; middle lobe concave. Filaments of two stamens unilaterally pilose.

Capsule obliquely oblong-lanceolate, unilaterally dehiscent, 7–9 mm long. Flowering and fruiting from August to September.

Reported from Sakhalin. *General distribution*: Japan. Described from Hakodate. Type in Leningrad.

40. *P. resupinata* L. Sp. pl. (1753) 608; Bge. in Ldb. Fl. Ross. III, 281; Turcz. in Bull. Soc. Nat. Mosc. XXIV, 2, 349; Maxim. in Mém. biol. Soc. Nat. Mosc. VI (1823) 31, tab. 10, f. 1; Bge. in Ldb. Fl. Ross. III, 282; Kom. Fl. Kamch. III, 81.—*P. lepidota* Wimm. in Bull. Soc. Nat. Mosc. XXIII, 1 (1850) 551.— *Ic.*: Stev. l.c.; Maxim. l.c.; Sugawara, Illustr. Fl. Sagh. IV, tab. 761.— *Exs.*: GRF, No. 931; Pl. alt. exs. No. 77.

Perennial. Root branched, with numerous thin fibers. Stems (often 2-several) branched or rarely simple, erect or flexuous, almost 4-angled (with decurrent lines from petiole base), subglabrous, densely leafy from base, 30–60 cm tall. Radical leaves absent, cauline alternate or sometimes opposite, short-petiolate, upper leaves subsessile, diffusely or sometimes densely pubescent above, sometimes densely tomentose beneath, entire, oblong-lanceolate or lanceolate, tapering above, broadly cuneate or almost truncate, incised serrate-crenate at base, with chondroid-dentate notches at tip, gradually reduced upward; uppermost leaves bractlike. Flowers subsessile, solitary in axils of upper leaves; upper leaves long crispate-hairy, very closely crowded. Calyx 8–9 mm long, tubular-campanulate, almost membranous, with two prominent veins, subglabrous or long crispate-hairy, bilobed, deeply cleft in front; teeth broadly deltoid, entire, ciliate, acute. Corolla purple, 20–25 mm long, tube slightly curved, slightly pilose outside, slightly shorter than galea; galea somewhat markedly falcate, dorsally pilose, transforming into curved beak; lip 3-lobed, broadly ovate, ciliate, slightly longer than galea. Filaments of two stamens pilose. Capsule 11–16 mm long, obliquely oblong, unilaterally dehiscent, abruptly narrowed into short beak. Flowering from June to August. Fruiting from July to September.

In meadows, cut-over forests.—*European USSR*: Urals *Western Siberia*: Ob' Region, Altai; *Eastern Siberia*: Lena-Kolyma, Angara-Sayan, Dauria; *Soviet Far East*: Kamchatka, Okhotsk, Zeya-Bureya, Uda Region, Ussuri, Sakhalin. *General distribution*: Mongolia, northern China, Korea, Japan.

Series 5. *Labradoricae* Vved.—Biennials. Stem usually branched. Leaves alternate, pinnatipartite. Galea with short beak, with two linear teeth.

41. *P. labradorica* Wirsing. Eclog. Bot. (1778) tab. 10.—*P. euphroides* Steph. ex Willd. Sp. pl. 3 (1800) 204; Bge. in Ldb. Fl. Ross. III, 284;

739 Turcz. in Bull. Soc. Nat. Mosc. XXIV, 2, 335; Maxim. in Mém. biol. XII, 901, f. 136; Kryl. Fl. Zap. Sib. X, 2510.— *Ic.* : Fedtsch. and Fler. Fl. Evrop. Ross. fig. 846.— *Exs.* : GRF, No. 1232a, 1232b (sub  *P. euphrasioidi* ).

Biennial. Stem usually with divergent branches from base, rarely simple, crispate-pubescent, (5)10–15(30) cm tall. Radical leaves reduced, in rosette; cauline leaves alternate, lower and middle leaves with crispate-puberulent petioles shorter than lamina; lamina crispate-pubescent especially beneath, linear-lanceolate, pinnatipartite; lobes linear-oblong, acute, sometimes chondroid-lobed; upper leaves and leaves on branches sublinear, subsessile, pubescent, entire, serrulate. Flowers on short pedicels, solitary in axis of floral leaves, similar to but smaller than upper cauline leaves, inflorescence spicate, lax in lower part, compact above, at stem and branch tips. Calyx subcoriaceous, reticulate, with 4 more prominent veins, glabrous or puberulent beneath, 6–7 mm long, shallowly (somewhat more deeply in front) bilobed, with asymmetrical lobes (teeth connate in pairs). Corolla yellow, later (always?) violet or reddish along galea, 17–19 mm long; tube suberect, 1.5 times as long as calyx; galea somewhat reclinate, slightly falcate, gradually tapering into obscure, obliquely truncate beak, with two linear teeth under it; lip 3-lobed, ciliolate, slightly shorter than galea. Filaments of two stamens pilose. Capsule horizontally diverging, sublinear, pointed, about 10 mm long, unilaterally dehiscent. Flowering from June to July. Fruiting from July to August (Plate XXXVIII, fig. 1).

In lichenaceous and mossy tundra, cedar, deciduous and pine forests, in open deciduous forests.— *Arctic Region* : Arctic Europe (eastern part), Arctic Siberia, Chukotka, Anadyr;  *Western Siberia* : Ob' Region (northern part), Altai;  *Eastern Siberia* : Yenisey, Lena-Kolyma, Angara-Sayan, Dauria;  *Soviet Far East* : Kamchatka, Okhotsk, Zeya-Bureya, Uda Region, Ussuri, Sakhalin.  *General distribution* : North America, Greenland. Described from Labrador.

Series 6.  *Sudeticae*  Vved.—Root reduced, with funiform fibers or vertical, branched. Leaves alternate, pinnatisect; segments linear or linear-lanceolate, pinnatipartite or rarely lobed or dentate. Corolla pink or purple, with teeth under galea tip, projecting or reclinate, i.e. at acute angle to galea axis; teeth sometimes absent.

42.  *P. sudetica*  Willd. Sp. pl. III (1800) 209; Bge. in Ldb. Fl. Ross. III, 286; Turcz. in Bull. Soc. Nat. Mosc. XXIV, 2, 336; Maxim. in Mém. biol. XII, 902; Kryl. Fl. Zap. Sib. X, 2512.— *P. tanacetifolia*  Adams in Mém. Soc. Nat. Mosc. V (1817) 102.— *P. eriostachys*  Ldb. ex Spr. Syst. II 740 (1825) 780.— *Ic.* : Mém. Soc. Nat. Mosc. VI, tab. 15, f. 2.— *Exs.* : Callier, Fl. Siles, exs. No. 431; Fl. exs. austro-hung. No. 632.

Perennial. Root reduced, with funiform fibers. Stems single or often several, simple, erect or ascending at base, hard, often thickset,



colored, usually glabrous or rarely somewhat densely long crispate-hairy, 5–15 cm tall. Radical leaves glabrous, with petioles slightly exceeding lamina; lamina usually with broadly, sometimes very broadly winged axis, linear-lanceolate, pinnatisect or pinnatipartite; segments linear-lanceolate, pinnately lobed or dentate; lobes or teeth of segments chondroid-pointed; cauline leaves absent or isolated, reduced, short-petiolate. Flowers in capitate, glabrous or villous inflorescence, elongated in fruit. Bracts lanceolate, tapering above, dentate. Calyx campanulate, almost herbaceous 10–15 mm long, with narrowly deltoid, acute teeth, dentate at tip, approximately equaling tube, posterior tooth shorter. Corolla pink or purple, or sometimes yellow, with purple galea, 20–25 mm long; tube erect, slightly shorter than galea; galea falcate at tip, with short, obliquely truncate beak, with two teeth under it; lip large, 3-lobed, slightly shorter than galea. Stamens with glabrous filaments. Capsule 12–15 mm long, obliquely oblong, abruptly narrowed into short, usually recurved beak. Flowering from July to August. Fruiting from August to September.

In mossy, less often lichen tundra, in mountain meadows in alpine zone.—*Arctic Region*: Arctic Europe, Novaya Zemlya, Arctic Siberia, Chukotka, Anadyr; *European USSR*: Dvina-Pechora, Urals; *Western Siberia*: Altai; *Eastern Siberia*: Lena-Kolyma, Angara-Sayan, Dauria; *Soviet Far East*: Kamchatka, Sakhalin (Kurils). *General distribution*: Central Europe, Arctic Region of Old and New World. Described from Sudeten and Siberia.

43. *P. villosa* Ldb. ex Spr. Syst. II (1825) 780; Bge. in Ldb. Fl. Ross. III, 289; Maxim. in Mél. biol. XII, 902, f. 142.—*lc.*: Maxim. l.c.

Perennial. Root vertical, branched. Stems sometimes several, simple, erect or twisted, colored, subglabrous or often somewhat densely long crispate-hairy, 10–20 cm tall. Radical leaves with subglabrous or long crispate-hairy petioles approximately equaling lamina; lamina with isolated long, crispate hairs, axis not winged, pinnatisect; segments spaced, lanceolate or linear-lanceolate, pinnatipartite, lobes usually long chondroid-pointed, usually entire; cauline leaves 1(2), reduced, with shorter petioles, otherwise similar. Flowers sessile or lower subsessile, in oblong, villous or rarely capitate inflorescence. Lowermost bracts leaflike, middle bracts shorter than flowers, 3-partite, lateral lobes reduced, linear, chondroid-serrate or few-lobed, middle lobe tapering, deeply chondroid-lobed, crispate-hairy at base. Calyx campanulate, with scarcely branched veins, slightly cleft in front, 10–12 mm long, densely long crispate-hairy, often villous; teeth deltoid-linear, very sharp, entire, 2/3 as long as tube. Corolla apparently purple, 20–22 mm long; tube erect, at least 2/3 as long as galea; galea slightly projecting, strongly falcate in upper half, with short, recurved, almost horizontally truncated, bidentate beak; lip

small, 3-lobed, slightly shorter than galea. Filaments of two stamens pilose. Capsule obliquely oblong or obliquely oblong-ovate, recurved at tip, 10–17 mm long. Flowering from July to August. Fruiting in August.

In lichenaceous tundra.—*Arctic Region*: Arctic Siberia, Chukotka, Anadyr; *Eastern Siberia*: Lena-Kolyma (northern part). Endemic. Described from Siberia without indication of exact location. Type in Leningrad.

*Note*. Apparently, hybrids between *P. villosa* and *P. langsдорffii* include *P. villosa* var. *glabrata* Trautv. [Tr. Peterb. bot. sada 5 (1877) 91] and *P. sudetica* var. *gymnostachya* Trautv. [l.c. 5 (1878) 550].

44. *P. nasuta* M.B. ex Stev. in Mém. Soc. Nat. Mosc. VI (1823) 43, tab. 15, f. 1; Bge. in Ldb. Fl. Ross. III, 279; Maxim in Mém. biol. XII, 848, f. 73.—? *P. apodochila* (non Maxim.) Sugawara, Illustr. Fl. Sagh. IV (1940) 1665, tab. 764.—*P. sudetica* and *P. villosa* var. *glabrata* auct. fl. Saghalin.—*l.c.*: Stev. *l.c.*

Perennial. Root vertical (?), comparatively slender, branched. Stems 1(2), simple, slender, slightly flexuous, colored, shining, glabrous or densely crispate-hairy under inflorescence and along its axis, 10–30 cm tall. Radical leaves glabrous, with petiole almost equaling lamina; lamina lanceolate, with very narrowly winged axis, pinnatisect; segments linear-lanceolate, spaced, pinnatifid, lobes of segments chondroid-pointed, chondroid-denticulate; cauline leaves absent or isolated, reduced, short-petiolate. Flowers subsessile, in capitate inflorescence, elongated in fruit. Bracts lanceolate, somewhat tapering at tip, chondroid-dentate. Calyx campanulate, cleft in front, 8–10 mm long, with long crispate hairs, almost herbaceous; teeth narrowly deltoid, acute, dentate at tip, 2/3 as long as tube, posterior tooth shorter. Corolla apparently purple, 20–24 mm long; tube slightly shorter than galea, slightly curved under throat; galea falcate above, with short, projecting and recurved, obliquely truncate, entire beak; lip large, shortly clawed, slightly shorter than galea. Stamens with glabrous filaments. Capsule 12–15 mm long, obliquely oblong, abruptly narrowed into short beak. Flowering from July to August. Fruiting from August to September,

Among grassy, bushy thickets in damp forests.—*Arctic Region*: Anadyr; *Soviet Far East*: Okhotsk, Sakhalin. Endemic. Described “from islands of Kamchatka Archipelago”. Type in Leningrad.

*Note*. *P. apodochila* Sugawara (*l.c.*) and *P. koidzumiana* Tatewaki and Ohwi [Act. Phytotax. and Geobot. 6 (1937) 148] apparently are synonyms; however, in the absence of relevant herbarium materials, it is difficult to say whether these plants are actually separate species or synonyms of *P. nasuta*. In the (English) description, the relationship of *P. koidzumiana* with *P. villosa* is mentioned, but the distinctive features between them are

not given. The description itself does not contain relevant information for differentiating the species in the complex group *Sudeticae*.

45. *P. uliginosa* Bge. in Ind. sem. Hort. Dorp. (1829) 8; Bge. i Ldb. Fl. Ross. III, 290; Turcz. in Bull. Soc. Nat. Mosc. XXIV, 2, 340; Maxim, in Mém. biol. XII, 904, f. 151; Kryl. Fl. Zap. Sib. X, 2515.—*P. rubens* var. *altaica* Bge. in Mém. Acad. Sc. Pétersb. diver. sav. II (1835) 571.—*P. rubens* var. *alata* K. and K. in Bull. Soc. Nat. Mosc. XV (1842) 419.—*lc.*: Ldb. Ic. pl. Fl. Ross. tab. 441 (sub *P. rubente*).

Perennial. Root short, with funiform, slightly thickened fibers. Stem single, hard, smooth, glabrous, or diffusely crispate-villous under and along axis of inflorescence, shining, erect or slightly flexuous, simple, scaly at base, slightly longer than or 2 times as long as radical leaves, (5)10–35 cm tall. Radical leaves with petiole slightly shorter than or 1/2 as long as lamina; lamina with narrowly winged axis, glabrous or crispate-pubescent beneath, mainly along veins, pinnatisect; segments lanceolate, chondroid-pointed, pinnately lobed, lobes chondroid-pointed, chondroid-dentate; cauline leaves with shorter petioles, reduced upward, otherwise similar. Inflorescence compact, elongated in fruit, lax, up to 17 cm long. Bracts diffusely crispate-villous, lowermost similar to upper leaves, middle bracts linear-lanceolate, pinnatisect; segments chondroid-pointed, chondroid-dentate; upper bracts linear, chondroid-dentate at tip. Calyx 10–14 mm long, tubular-campanulate, on up to 10 mm long pedicels in lower flowers, with 10 long crispate-hairy veins, reticulate in between, unequally 5-toothed; teeth deltoid-lanceolate, entire or dentate, 1/3 as long as tube. Corolla purple, 20–25 mm long; tube 1.5 times as long as galea; galea falcate above, comparatively short-beaked, bidentate; lip slightly shorter than galea. Filaments of two  
743 stamens pilose or all glabrous. Capsule obliquely oblong-lanceolate, 10–20 mm long. Flowering from July to August. Fruiting from August to September.

In sasa grass plots, along banks of streams, in high-mountain zone.—*Western Siberia*: Altai; *Eastern Siberia*: Angara-Sayan, Dauria; *Soviet Central Asia*: Dzh.-Tarbagatai, Tien Shan, Pamiro-Alai. *General distribution*: Mongolia. Described from Charysh River. Type in Lenin-grad.

*Note*. Plants from the Tien Shan and Pamiro-Alai are distinguished by large capsules and need further study.

Series 7. *Striatae* Vved.—Root vertical, branched or fascicular, with fusiform thickened fibers. Leaves alternate, pinnatisect; segments linear, spaced, horizontally diverging, serrate. Galea falcate above, short-beaked, bidentate.



46. *P. striata* Pall. Reise, III (1776) 737, tab. R, f. 2; Bge. in Ldb. Fl. Ross. III, 285; Turcz. in Bull. Soc. Nat. Mosc. XXIV, 2, 338; Maxim. in Mél. biol. XII, 910, f. 159.—*lc.*: Pall. l.c.; Maxim. l.c.—*Exs.*: Karo, Pl. Dahur. No. 162.

Perennial. Root vertical, branched. Stems sometimes several, simple, erect, hard, crispate-pubescent or crispate-puberulent, later sometimes becoming glabrous, (10)20–30(50) cm tall. Radical leaves with crispate-pubescent or crispate-puberulent petioles shorter than or equaling lamina; lamina with winged axis, diffusely crispate-hairy or glabrous, lanceolate, pinnatisect; segments linear, spaced, horizontally diverging, chondroid-pointed, sharply chondroid-serrate; cauline leaves numerous, reduced upward, short-petiolate or upper leaves sessile, otherwise similar. Inflorescence elongated, dense at flowering stage, becoming lax in fruit. Lower bracts deltoid in shape, 3-segmented, with elongated, dentate or entire middle segment; middle and upper bracts, except lowermost, shorter than flowers, glabrous or crispate-ciliate. Calyx campanulate, 10–13 mm long, coriaceous, glabrous, crispate-ciliate only along teeth, teeth half as long as tube; lateral teeth connate for considerable length, upper tooth deltoid, shorter. Corolla yellow, with purple veins, 25–32 mm long; tube slightly curved below throat, approximately equaling galea; galea erect, falcate above, short-beaked, beak truncate, with two teeth beneath; lip 3-lobed, adherent to galea, long clawed, slightly shorter than galea. Filaments of two stamens pilose. Capsule linear-lanceolate, subsymmetrical, acute, 11–16 mm long. Flowering from June to July. Fruiting from July to August.

744 In meadows, open forests, on steppe slopes.—*Eastern Siberia*: Angara-Sayan (eastern part), Dauria; *Soviet Far East*: Zeya-Bureya. *General distribution*: Mongolia, northern China. Described from Burgutui (Kyakhta) Range and from valley of Urunlyungui River. Isotype in Leningrad.

47. *P. elata* Willd. Sp. pl. III (1800) 210; Bge. in Ldb. Fl. Ross. III, 285; Turcz. in Bull. Soc. Nat. Mosc. XXIV, 2, 337; Maxim. in Mél. biol. XII, 902, f. 141; Kryl. Fl. Zap. Sib. X, 2511.—*lc.*: Mém. Soc. Nat. Mosc. VI, tab. 11, fig. 2 (sinistra).

Perennial. Root fascicular, with fusiform thickened fibers. Stems (sometimes 2–3) simple, erect, glabrous, shining, densely leafy, stout, 30–50 cm tall. Radical leaves with petiole equaling lamina; lamina glabrous, with winged axis, lanceolate, pinnatisect; segments linear, chondroid-pointed, finely serrulate, horizontally diverging, spaced; cauline leaves gradually reduced upward, with shorter petioles, uppermost leaves sessile, otherwise similar. Inflorescence elongated, dense, later interrupted in lower part. Bracts deltoid, or (upper) rhombic, villous-ciliate at base, 3-segmented, with elongated, sharply pinnatifid or serrate middle segment,

sometimes somewhat arachnoid-pilose. Calyx obliquely ovate, 5–7 mm long, membranous-coriaceous, glabrous or arachnoid-hairy along veins, with obscure veins, deeply cleft in front; lateral teeth obliquely deltoid, connate for considerable length, acute, entire, several times shorter than tube; upper tooth deltoid, acute, entire, erect. Corolla purplish pink, 21–25 mm long; tubes broad, erect, crispate-hairy outside, curved under throat, approximately equaling galea; galea falcate above, short-beaked, beak ending into two small projecting teeth; lip long clawed, serrate, 3-lobed, slightly shorter than galea. Filaments of two stamens villous. Capsule 10–12 mm long, linear-lanceolate, rather abruptly narrowed into short beak. Flowering in June. Fruiting in July.

In dry and alkaline meadows, along forest edges, in subalpine meadows.—*Western Siberia*: Ob' Region (southern part), Irtysh, Altai; *Eastern Siberia*: Angara-Sayan; *Soviet Central Asia*: Dzh.-Tarbagatai. *General distribution*: Mongolia. Described from Kacha River. Isotype in Leningrad.

Series 8. *Rostratae* Vved.—Root reduced with fine funiform fibers. Leaves alternate, pinnatisect; segments oblong or oblong-lanceolate, pinnatifid-lobed. Galea glabrous in front, curved more than at right angle, tapering into straight edentate beak. Corolla tube erect.

- 745 48. *P. nordmanniana* Bge. in Ldb. Fl. Ross. III (1847–1849) 277; Boiss. Fl. or IV, 489; Maxim. in Mél. biol. XII, 847; Grossh. Fl. Kavk. III, 401.—*Exs.*: GRF, No. 632; Fl. Cauc. exs. No. 147.

Perennial. Rootstock short, oblique, with fine funiform fibers. Stems 1-several, simple, erect or ascending at base, slender, shining, colored, glabrous or with two hairy lines, (5)10(20) cm tall. Radical leaves with shining glabrous petioles slightly shorter than or equaling lamina; lamina glabrous or with isolated crispate hairs beneath, lanceolate, pinnatisect; segments oblong or oblong-lanceolate, pinnatifid-lobed, lower segments spaced, upper closer; lobes of segments chondroid-pointed, deltoid, sometimes with obscure tooth; cauline leaves alternate, few, with shorter petioles, or upper leaves sessile, less dissected. Flowers on short pedicels in few-flowered, rather compact inflorescence, sometimes lax in lower part. Bracts slightly shorter or longer than calyx, rhombic in shape, with cuneate, scarious, sometimes ciliate base, deeply pinnatipartite, with chondroid-pointed lobes. Calyx tubular-campanulate, 7–8 mm long, almost membranous, glabrous, with prominently branched veins, more deeply cleft in front; teeth subequal, deltoid-lanceolate, acute, dentate,  $1/2$  as long as tube. Corolla pinkish-purple, 13–15 mm long; tube erect, equaling calyx; galea curved more than right angle, tapering into straight truncate beak; lip broad, 3-lobed, 9–10 mm long. Filaments of two stamens pilose or villous. Capsule 9–13 mm long, obliquely oblong, abruptly narrowed

into short straight beak. Flowering from July to August. Fruiting from August to September (Plate XXXVIII, fig. 3).

In alpine meadows.—*Caucasus*: Ciscaucasia, Dagestan, western, eastern and southern Transcaucasia. *General distribution*: Asia Minor. Described from Georgia. Isotype in Leningrad.

Series 9. *Incarnatae* Vved.—Root reduced, with slender or funiform fibers. Leaves alternate, pinnatisect; segments linear-lanceolate, lanceolate or oblong-lanceolate, lobed. Galea glabrous or villous-ciliate in front, with somewhat long, edentate, projecting or recurved beak. Corolla tube erect or falcate.

49. *P. proboscidea* Stev. in Mém. Soc. Nat. Mosc. VI (1823) 33 (exclus. syn.); Ldb. Fl. Ross. III, 279; Maxim. in Mém. biol. XII, 838, f. 56; Kryl. Fl. Zap. Sib. X, 2502.— *Ic.*: Maxim. l.c.— *Exs.*: Pl. alt. exs. No. 78 (sub *P. uncinata*).

746 Perennial. Root short, with thin fibers. Stem stout, erect, shining, glabrous, arachnoid-hairy only along inflorescence axis, 45–80 cm tall. Radical leaves with long petioles, shorter than lamina; lamina glabrous, lanceolate, with narrowly winged axis, pinnatisect; segments linear-lanceolate, spaced, slightly decurrent, deeply pinnately lobed; lobes obliquely deltoid, slender chondroid-pointed, finely chondroid-denticulate; cauline leaves alternate, gradually reducing upward, short-petiolate; upper leaves sessile, with less distant parts, otherwise similar. Inflorescence dense, elongated, 10–20 cm long. Bracts arachnoid villous-ciliate, linear, lowermost bracts without flowers, serrate at tip. Calyx subsessile, ovate, 5–6 mm long, membranous, glabrous, with 5 thick and 5 thin branched veins, deeply cleft in front, with 5 herbaceous, obliquely deltoid-lanceolate, acute, entire villous-ciliate teeth, at least 1/2 as long as tube. Corolla yellow, 16–17 mm long; tube short (5 mm long), erect, curved in throat, appearing falcate; galea narrow, projecting, constricted and villous along margin in throat, dorsally smoothly rounded, gradually transformed into short, projecting beak obliquely truncate at tip; lip broad, 9 × 15 mm, villous-ciliate, 3-lobed, middle lobe suborbicular, about 5 mm broad. Filaments of two stamens villous. Capsule obliquely ovate, abruptly narrowed into short beak, 9–10 mm long. Flowering from June to July. Fruiting from July to August (Plate XXXVI, fig. 2).

In subalpine and alpine meadows.—*Western Siberia*: Altai; *Soviet Central Asia*: Dzh.-Tarbagatai. *General distribution*: Mongolia. Described from vicinity of Zmeinogorsk.

50. *P. brachystachys* Bge. in Ldb. Fl. alt. II (1830) 429; in Ldb. Fl. Ross. III, 279; Maxim. in Mém. biol. XII, 836, f. 62; Kryl. Fl. Zap. Sib. X, 2501.— *Ic.*: Ldb. Ic. Pl. Fl. Ross. tab. 427.



Perennial. Root apparently reduced, with funiform fibers. Stems rarely 2, simple, erect, long crispate-hairy, 20–50 cm tall. Cauline leaves short-petiolate, crispate-hairy above along axis, beneath mainly along veins, lanceolate, pinnatisect; lowermost segments spaced, others closer, linear-lanceolate, pinnately lobed; lobes projecting, deltoid, chondroid-pointed, chondroid-serrulate, reduced upward, uppermost sessile. Flowers sessile in capitate or often oblong inflorescence. Bracts incised-pinnatipartite, with tapering apical lobe, again lobed, long crispate-hairy, shorter than flowers, calyx campanulate, 7–8 mm long, almost membranous, with branched  
 747 veins, pilose; teeth broadly deltoid, acute, entire, 1/2 as long as tube. Corolla yellow, 16–17 mm long; tube falcate, shorter than galea, twisted at flowering stage; galea falcate above, villous-ciliate in front, gradually transforming into long, recurved beak; lip large, broader than long, 3-lobed, ciliate in front, completely covering galea. Filaments of two stamens pilose. Capsule about 10 mm long, obliquely ovate, abruptly narrowed into very short beak. Flowering from June to July. Fruiting from July to August.

On stony and clayey-stony slopes in alpine zone.—*Western Siberia*: Altai; *Eastern Siberia*: Angara-Sayan. Endemic. Described from Aigulak-ski belki. Isotype in Leningrad.

51. *P. incarnata* L. Sp. pl. (1753) 609.—*P. uncinata* Steph. in Willd. Sp. pl. III (1800) 213; Bge. in Ldb. Fl. Ross. III, 280; Turcz. in Bull. Soc. Nat. Mosc. XXIV, 2, 345; Maxim. in Mém. biol. XII, 855, f. 82; Kryl. Fl. Zap. Sib. X, 2503.— *Ic.*: Stev. in Mém. Soc. Nat. Mosc. VI, tab. 12.

Perennial. Root reduced, with funiform fibers. Stems sometimes two, simple, erect, stout, glabrous, crispate-pilulose under inflorescence and along its axis, 30–100 cm tall. Radical leaves numerous, with glabrous petioles slightly shorter than lamina; lamina lanceolate, pinnatisect; segments distant and reduced in lower part, overlapping above along margins, linear-lanceolate or oblong-lanceolate, incise-lobed; lobes of segments obliquely deltoid, acute, sharply chondroid-serrate; cauline leaves numerous, reduced upward and gradually transformed into bracts; lower leaves short-petiolate, upper sessile, with serrate segments. Flowers on very short pedicels in dense, elongated (up to 30 cm), spicate inflorescence, interrupted at base. Lowermost bracts often leaflike, middle lanceolate, villous-ciliate at base, linear, serrulate at tip. Calyx broadly campanulate, (5)6(7) mm long, subcoriaceous, with veins branched in upper part, glabrous; teeth broadly deltoid, acute, entire, densely ciliolate, 1/2 as long as tube. Corolla yellow, 12–15 mm long; tube scarcely curved, slightly longer than calyx; galea curved almost at right angle, gradually transformed into rather long, projecting beak, sometimes with large tooth above throat; lip broad, 3-lobed, with large middle lobe, ciliate, slightly shorter than galea. Filaments of two stamens pilose. Capsule obliquely

oblong, abruptly narrowed into recurved short beak 8–10 mm long. Flowering from June to July. Fruiting from July to August.

748 In tall-herb meadows, along forest edges.—*Arctic Region*: Arctic Siberia (mouth of Yenisey River); *European USSR*: Urals (Baskak Range) (?); *Western Siberia*: Ob' Region (southern part), Altai, *Eastern Siberia*: Yenisey, Angara-Sayan, Dauria. *General distribution*: Mongolia. Described from Siberia. Type in London.

Series 10. *Compactae* Vved.—Root fascicular with numerous fusiform thickened fibers. Leaves alternate, pinnatisect; segments lanceolate, serrate-lobed, spaced. Calyx saccate-campanulate, with swelling at base. Galea glabrous in front, with long, edentate, recurved beak; corolla tube curved at right angle or almost so.

52. *P. compacta* Steph. in Willd. Sp. pl. III (1800) 219; Bge. in Ldb. Fl. Ross. III, 280; Turcz. in Bull. Soc. Nat. Mosc. XXIV, 2, 346; Maxim. in Mém. biol. XII, 856, f. 81; Kryl. Fl. Zap. Sib. X, 2504.— *Ic.*: Stev. in Mém. Soc. Nat. Mosc. VI, tab. 11.

Perennial. Root reduced, with fusiform thickened fibers. Stems often single or several, simple, erect, glabrous, with stripes of long crispate hairs in upper part, 25–50 cm tall. Radical leaves with glabrous petioles approximately equaling lamina; lamina glabrous, lanceolate, pinnatisect; segments lanceolate, serrate-lobed, spaced, converging only at tip; lobes of segments deltoid, chondroid-pointed, chondroid-serrate; cauline leaves reduced upward, lower leaves short-petiolate, upper sessile, pinnatipartite, less dissected. Flowers sessile in very compact, usually oblong, glabrous or somewhat coarsely villous inflorescence. Lowermost bracts leaflike, middle barely discernible, usually shorter than calyx, linear or lanceolate, dentate or spatulate at tip; flabellately incised or parted, glabrous or somewhat densely pilose, sometimes almost villous. Calyx saccate-campanulate, with swelling at base, membranous, with prominent, weakly and finely branched veins, 9–12 mm long, glabrous or with long crispate hairs; teeth very broadly deltoid, acute, entire, densely ciliolate, several times shorter than tube. Corolla yellow, 17–20 mm long; tube curved above calyx throat at obtuse or sometimes almost at right angle, approximately equaling galea; galea scarcely reclinate or not, curved at tip and tapering into long, straight beak pointing downward; lip 3-lobed, ciliate or subglabrous, slightly shorter than galea. Filaments of two stamens pilose. Capsule obliquely ovate, 11–13 mm long. Flowering from June to August. Fruiting from July to September.

In meadows, among scrub, in mountains in alpine region.—*Arctic Region*: Arctic Siberia (western part); *European USSR*: Dvina-Pechora (eastern part), Urals; *Western Siberia*: Altai; *Eastern Siberia*: Yenisey,

Angara-Sayan, Dauria (western part); *Soviet Central Asia*: Dzh.-Tarbagatai, (Tarbagatai, Saur). *General distribution*: Mongolia. Described from Siberia. Isotype in Leningrad.

*Note*. A polymorphic species, varying greatly in bract form and pubescence and leaf arrangement; it deserves further study with specially collected material.

Series 11. *Physocalyces* Vved.—Root reduced, with thick funiform or fusiform fibers. Leaves alternate, pinnatipartite or pinnatisect; segments linear-lanceolate, lanceolate or oblong. Calyx somewhat inflated after flowering; galea hooked at tip, with two teeth bent downward, i.e. parallel to galea axis. Corolla tube erect.

53. *P. dasystachys* Schrenk in Bull. phys.-math. Acad. Sc. Pétersb. II (1844) 195; Kryl. Fl. Zap. Sib. X, 2513.—*P. laeta* Stev. ex Claus in Goebel. Reise, 2 (1838) 296 (nom. nud.); Bge. in Ldb. Fl. Ross. III, 289; Maxim. in Mél. biol. XII, 906, f. 150; Schmalh. Fl. II, 288.—*P. rubens* var. *desertorum* Bge. Suppl. alt. (1835) 66.—*P. rubens* var. *altaica* K. and K. in Bull. Soc. Nat. Mosc. XV (1842) 419.—*P. tanacetifolia* (non Adams) Bge. in Bull. phys.-math. Acad. Sc. Pétersb. I (1843) 337.—*Id.*: Maxim. l.c.—*Exs.*: GRF, No. 124.

Perennial. Root reduced with thick funiform fibers. Stems 1-several, simple, erect, slightly shining, glabrous or puberulent, somewhat villous under inflorescence, scaly at base, 10–30 cm tall. Radical leaves with shining petioles, petioles pubescent above, shorter than lamina; lamina oblong lanceolate, glabrous, hairy only along axis, pinnatipartite; lobes deeply pinnatifid, ovate or lanceolate, cauline leaves oblong-chondroid-margined, subobtusate, serrulate; cauline leaves oblong-ovate, short-petiolate, upper leaves sessile, with sharper teeth, otherwise similar. Inflorescence compact, subcapitate, elongated in fruit, somewhat lax, up to 15 mm long, white-pubescent, tufted, surrounded by leaves at base. Bracts linear, exceeding calyx, glabrous in upper half, chondroid-pointed, lower bracts sharply chondroid-denticulate in upper half, upper bracts entire. Calyx 5–6 × 11–13 mm, broadly campanulate, slightly inflated, herbaceous, sometimes colored, sessile, unequally 5-toothed; teeth acuminate, chondroid-margined, lanceolate with deltoid base, glabrous above, villous beneath along margin, entire, 1/2 as long as tube. Corolla bright pink or white (albinos ?), 22–25 mm long, glabrous, with erect tube, galea scarcely reclinate, curved above, short-beaked, bidentate, slightly exceeding lip; lip broadly ovate, serrulate, 7–8 mm broad, middle lobe rounded, clawed (2.5 × 3 mm). Stamens with glabrous filaments. Capsule ovate, abruptly mucronate, 8–10 mm long. Flowering in May. Fruiting in June.

In alkaline soils, in alkaline and flooding meadows.—*European USSR*: Lower Don, Volga-Don, Trans-Volga Region, Black Sea Region; *Western*



*Siberia*: Upper Tobol, Irtysh, Altai; *Soviet Central Asia*: Dzh.-Tarbagatai. *General distribution*: Mongolia. Described from Ishim River. Type in Leningrad.

*Note*. I was unable to see the specimens on which Grossheim based his citation of this species under the name *P. laeta* Stev. for the Main Range (Grossg. Fl. Kavk. 3, 403); however, its occurrence in the Caucasus is very doubtful.

54. *P. physocalyx* Bge. in Bull. Acad. Sc. Pétersb. VII (1841) 252 in Bull. phys.-math. Acad. Sc. Pétersb. I, 382; in Ldb. Fl. Ross. III, 295; Maxim, in Mém. biol. XII, 905, f. 155; Kryl. Fl. Zap. Sib. X 2520 (excl. ar. geogr., p.p.).—*P. flava* (non Pall.) Ldb. Fl. alt. II (1830) 433.—*P. flava* var. *altaica* and var. *conica* Bge. in Mém. Acad. Sc. Pétersb. div. sav. 2 (1835) 570.—*P. fedtschenkoi* Bonati in Bull. Soc. Nat. Fr. LIX (1914) 233, tab. 4.—*Id.*: Ldb. Ic. pl. Fl. Ross. tab. 439 (sub *P. flava*); Bonati, l.c.

Perennial. Root reduced, with numerous, fine, remotely thickened fibers. Stems single or few, simple, usually twisted and ascending, rarely erect, thick, thickened upward, stumpy, very finely crispate-puberulent, subarachnoid, 10–20 cm tall. Radical leaves with crispate-puberulent petioles  $1/2$  as long as lamina; lamina subglabrous or glabrous, lanceolate, pinnatisect; segments oblong, spaced, decurrent on axis, thus appearing winged, incise-pinnatifid; lobes of segments acute, chondroid, chondroid-serrulate; cauline leaves reduced upward, short-petiolate or upper leaves sessile, less dissected, otherwise similar. Flowers on short pedicels, in dense, oblong, finely villous inflorescence, interrupted in lower part, elongated in fruit. Lowermost bracts leaflike, middle bracts 3-lobed, with middle lobe much larger, chondroid incise-lobed. Calyx broadly campanulate, slightly inflated in fruit, almost herbaceous, reticulate-nerved, 16–20 mm long, finely villous; teeth deltoid, very sharp, chondroid-serrulate or subentire,  $2/3$  as long as tube. Corolla yellowish, 26–35 mm long, glabrous outside or with hairy lines near throat, sometimes villous inside throat; tube erect, approximately equaling galea; galea straight, hooked at tip, short-beaked, with two recurved teeth under beak; lip 3-lobed, small, glabrous along margin, long clawed, slightly shorter than galea. Filaments of two stamens somewhat pilose. Capsule 10–15 mm long, oblong-ovate or ovate, symmetrical, abruptly narrowed into short beak. Flowering from May to June. Fruiting from June to July.

In stony and sandy steppes.—*European USSR*: Volga-Don (Saratov), Trans-Volga Region; *Western Siberia*: Upper Tobol, Irtysh, Altai; *Soviet Central Asia*: Aral-Caspian Region (Uil), Balkash Region (eastern part). *General distribution*: Kuldzha. Described from Altai (Riddersk, Bukhtarminsk). Isotype in Leningrad.



55. *P. songarica* Schrenk in Bull. phys.-math. Acad. Sc. Pétersb. I (1842) 79; Enum. pl. nov. II, 25; Bge. in Ldb. Fl. Ross. III, 287.—*P. sude-tica* var. *macrodonata* K. and K. in Bull. Soc. Nat. Mosc. XV (1842) 419.

Perennial. Root short, with finely fusiform fibers. Stem simple, erect, hard, thickset, glabrous, slightly shining, scaly at base, 10–25 cm tall. Radical leaves with glabrous petioles,  $1/2$  as long as lamina or several times shorter; lamina glabrous or crispate-hairy beneath, with winged axis, pinnatisect; segments lanceolate or linear-lanceolate, slightly spaced, decurrent and closer at tip, subacute, pinnately serrate-lobed; lobes of segments chondroid-pointed, chondroid 1–2-toothed; cauline leaves few, 1(3), reduced, short-petiolate or sessile, less dissected, otherwise similar. Inflorescence elongated, dense, pedicels of lower flowers up to 7 mm long. Bracts long crispate-ciliate at base, fugaceous, lowermost bracts leaflike, middle linear, sometimes with lateral, linear, extremely reduced, entire lobes; middle lobe chondroid-serrate, with recurved margin. Calyx tubular-campanulate, 12–15 mm long, scarcely inflated in fruit, herbaceous, reticulate-veined, long crispate-hairy or subglabrous; teeth linear-deltoid, acute, entire,  $1/2$  as long as tube, upper tooth at least  $1/2$  as long. Corolla yellow (?), glabrous, 25–28 mm long; tube long (2–2.5 times as long as galea), erect; galea straight, hooked at tip, short-beaked, bidentate with recurved teeth; lip glabrous along margin and in throat, 3-lobed, slightly shorter than galea, long clawed. Filaments of two stamens pilose. Capsule obliquely oblong-lanceolate, 15–16 mm long. unilaterally dehiscent. Flowering from June to July. Fruiting from July to August.

In spruce forests and in subalpine meadows.—*Soviet Central Asia*: Dzh.-Tarbagatai (Dzhungar Ala-Tau). Endemic. Described from Dzhabyk. Type in Leningrad.

56. *P. pubiflora* Vved. sp. nov. in Addenda XXI, 812.—*P. songorica* auct. fl. As. Med. quoad pl. Tianschan.—*P. physocalyx* auct. fl. As. Med. quoad pl. Tiansch. and Pamiro-alaj.—*P. fedtschenkoi* (non Bonati) Vved. in herb.

Perennial. Root reduced, with fusiform thickened fibers. Stems often 2–3, simple, erect, thickset, glabrous or rarely crispate-hairy under inflorescence, (5)10–20 cm tall. Radical leaves with glabrous petioles  $1/3$ – $2/3$  as long as lamina; lamina glabrous above, crispate-hairy beneath, lanceolate, with narrowly winged axis, pinnatisect; segments

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Plate XXXVIII.

1. *Pedicularis labradorica* Wirsing., general appearance of plant, flower, leaf.—2. *P. altripurpurea* Nordm., general appearance of plant, flower, section of leaf.—3. *P. nordmanniana* Bge, general appearance of plant, leaf, flower.



lanceolate or linear-lanceolate, somewhat spaced in lower part, closer above, incise-pinnatilobate; lobes of segments projecting, chondroid-pointed, entire or sparsely chondroid-serrate; cauline leaves 1–3, reduced, short-petiolate, with broader axis, otherwise similar. Flowers pedicellate (pedicels up to 8 mm long in lower flowers), in oblong, dense inflorescence, sometimes interrupted in lower part. Lowermost bracts leaflike, middle linear, with long crispate hairs, chondroid-dentate at tip, shorter than flowers. Calyx tubular-campanulate, almost herbaceous, with 5 prominent veins forming fine reticulum with their branches, glabrous or somewhat densely crispate-hairy, 14–20 mm long, scarcely inflated in fruit; teeth narrowly deltoid, acute, entire, 1/2 as long as tube. Corolla pale yellow, with purple (always ?) teeth, densely puberulent outside (especially on galea), 20–28 mm long; tube erect, 1.5 times as long as galea; galea erect, hooked at tip, short-beaked, with two recurved teeth; lip small, 3-lobed, glabrous along margin and in throat, serrate, slightly shorter than galea. Filaments of two stamens pilose. Capsule obliquely elongated-oblong, unilaterally (always ?) dehiscent, 14–20 mm long. Flowering from June to July. Fruiting from July to August (Plate XXXVII, fig. 1).

In alpine and subalpine meadows.—*Soviet Central Asia*: Dzh.-Tarbagatai (Dzhungar–Ala-Tau), Tien Shan, Pamiro-Alai (Alai Range).

*General distribution*: Kuldzha. Described from Aktash (Sonkultau). Type in Tashkent.

*Note*. Plants from Dzhungarskii Ala-Tau are distinguished by a ciliate lip. Besides, N.I. Rubzov's specimens from Burkhan-Sartau have a distinct purple venation on the corolla. A similar purple color pattern is noticeable in S.I. Korshinsky specimens from Aram-Kungei. These need further study.

- 755      57. *P. alatauica* Stadlm. in herb. and ex Limpr. in Fedde, Repert. XX (1924) 265 (nomen); Addenda XXI, 813.—*P. almaatensis* M. Pop. in Tr. Almaat. Gos. zapov. 3 (1940) 42 (nom. nud.).

Perennial. Root reduced, with intensely thickened fusiform fibers. Stems sometimes 2–3, simple, erect or slightly flexuous, thickset, rather thick, often finely long crispate-hairy, 5–15 cm tall. Radical leaves with finely crispate-hairy or subglabrous petioles, 1/3–1/2 as long as lamina; lamina glabrous above, with long, fine crispate hairs beneath, linear-lanceolate, with narrowly winged axis, pinnatisect; segments oblong, obtuse, sometimes spaced in lower part, pinnatipartite, decurrent; lobes of segments obtuse, usually chondroid-pointed, sparsely chondroid-dentate; cauline leaves 1–2, reduced, on shorter petioles, otherwise similar. Flowers on short pedicels (up to 5 mm long in lower flowers), in oblong or elongated, rarely capitate inflorescence. Lowermost bracts leaflike, middle bracts with lanceolate, somewhat crispate-hairy base, linear,

chondroid-dentate at tip, shorter than flowers. Calyx tubular-campanulate, almost membranous, usually pink, with 5 prominent veins with fine reticulum in between, subglabrous or somewhat densely long crispate-hairy, 14–17 mm long, slightly inflated in fruit; teeth deltoid, acute, crispate-ciliate,  $1/4$  as long as tube. Corolla pink, puberulent outside, 28–30 mm long; tube erect, slightly longer than galea; galea erect, hooked at tip, short-beaked, with two recurved teeth; lip usually small, 3-lobed, glabrous along margin and in throat, serrate,  $2/3$  or at least  $1/2$  as long as galea. Stamens with glabrous filaments or two with isolated hairs. Capsule 15–18 mm long, obliquely elongated-oblong, unilaterally (always ?) dehiscent, abruptly narrowed into short, erect beak. Flowering from June to July. Fruiting from July to August (Plate XXXVII, fig. 2).

On dry slopes and rocks in alpine zone.—*Soviet Central Asia*: Tien Shan, Pamiro-Alai (Alai range). *General distribution*: eastern Tien Shan. Described from Trans-Ili Ala-Tau (Kaskelen River). Type in Helsinki.

Series 12. *Comosae* Vved.—Root reduced, with funiform or often somewhat fusiform thickened fibers, rarely stout, branched. Leaves alternate, 1–2-pinnatisect, or almost 3-pinnatisect. Corolla usually yellow, rarely pink; teeth under galea tip projecting and recurved, i.e. at acute angle with galea axis; corolla tube erect or curved under throat.

756 58. *P. mandshurica* Maxim. in Mél. biol. X (1877) 120; in Mél. biol. XII, 904, f. 154.—*lc.*: Maxim. l.c.

Perennial. Root reduced with funiform fibers. Stem simple, erect, hard, crispate-puberulent, later subglabrous, 15–30 cm tall. Radical leaves numerous, with crispate-puberulent petioles,  $(1/3)1/2$  as long as lamina; lamina with fine crispate hairs, subglabrous, broadly lanceolate, pinnatisect, segments spaced, linear-lanceolate, tapering, acute, pinnatipartite or deeply pinnatilobate; lobes projecting, subdeltoid, chondroid-pointed, chondroid-serrulate; cauline leaves with shorter petioles, with narrowly winged axis, reduced upward, gradually transformed into bracts, otherwise similar. Flowers short-pedicellate in lax, up to 25 cm long inflorescence. Lowermost bracts leaflike, middle linear-lanceolate, slightly longer than flowers, subglabrous, finely crispate-ciliate at base, pinnatipartite or pinnatilobate; lobes projecting, deltoid or elongated deltoid, chondroid-pointed, chondroid-serrate. Calyx tubular-campanulate, almost herbaceous, 12–14 mm long, glabrous or densely crispate-puberulent beneath; teeth spatulate, sharply chondroid-dentate,  $2/3$  as long as tube, posterior tooth reduced. Corolla light yellow, 25–30 mm long; tube erect, slightly longer than galea, galea scarcely projecting, falcate at tip, with short beak ending into two short projecting and recurved teeth; lip large, 3-lobed, glabrous along margin, long clawed, approximately equaling galea. Stamens with villous filaments. Capsule subcylindrical, subsymmetrical, mucronate,

12–18 mm long. Flowering from June to July. Fruiting from July to August.

On grassy dry mountain slopes.—*Soviet Far East*: Ussuri. *General distribution*: North Korea. Described from several places in coastal regions of Sea of Japan. Type in Leningrad.

59. *P. grandis* M. Pop. sp. nov. in Addenda XXI, 814.

Perennial. Root fibrous, with slightly thickened fibers. Stem single, erect, hard, thick, simple, villous (especially in lower part), 50–80 cm tall. Leaves alternate, radical and lower cauline with villous petioles, 1/2 as long as lamina; lamina elongated-oblong, pinnatisect; segments decurrent, oblong or lanceolate, unequally pinnatifid; lobes unequally sharply chondroid-dentate; middle leaves short-petiolate, upper sessile, less dissected. Inflorescence interrupted in lower part, 20–40 cm long. Bracts, especially lower, similar to upper leaves, upper bracts usually 3-partite, middle lobe elongated, pinnate-cristate. Flowers sessile or lower flowers short-petiolate. Calyx gray-tomentose-pilose, 12–14 mm long, cylindrical, membranous, with 5 thick and 5 thin veins without reticulum in between; teeth glabrous, linear, broadly spatulate at tip, denticulate, 1/3–1/2 as long as tube; posterior tooth shorter than others, deltoid, entire. Corolla yellowish, 30–33 mm long; tube erect, slightly exerted from calyx; galea falcate from base, beak bidentate, longer than broad; lip 3-lobed, serrate, almost equaling galea. Filaments of two stamens villous, others glabrous or sparsely pubescent. Flowering in May.

—*Soviet Central Asia*: Pamiro-Alai. Found once by Popov in a shady poplar grove near village of Gilyan. Endemic. Type in Tashkent.

60. *P. dolichorrhiza* Schrenk in Bull. phys.-math. Acad. Sc. Pétersb. I (1842) 80; Enum. pl. nov. II (1842) 23; Bge. in Ldb. Fl. Ross. III, 291; Maxim. in Mém. biol. XII, 905, f. 146; Bonati in Bull. Soc. Nat. Fr. LXI, 288; Kryl. Fl. Zap. Sib. X, 2515.—*P. breviflora* Bonati, l.c. 232 an etiam Rgl.?—*l.c.*: Maxim. l.c.; Prain in Ann. Bot. Gard. Calcutta, 3, tab. 30, f. B.

Perennial. Root short, with long, elongated fusiform fibers. Stems 1(2–3), erect or slightly flexuous, elongated, with ribs decurrent from leaf base, sulcate, with long crispate hairs mainly along grooves, sometimes somewhat villous, 1.5–2 times as long as radical leaves or often longer, 10–85 cm tall; cauline leaves 5–10, alternate, reduced upward, lower leaves with short, ciliate petioles, middle and upper sessile, oblong-lanceolate or lanceolate, pinnatipartite; lobes oblong-lanceolate or lanceolate, sharply chondroid-pointed, pinnately lobed, often decurrent on winged axis; lobules sharply chondroid-pointed, sharply chondroid-denticulate, glabrous above or with isolated crispate hairs, somewhat crispate-pubescent beneath along axis and veins; radical leaves with longer



petioles, absent at flowering stage. Inflorescence elongated, (3)7–35 cm long, lax, very rapidly elongating, lower flowers sometimes very distant. Lowermost bracts leaflike or cristate-lobed, lobes sharply chondroid-pointed, sharply chondroid-denticulate, several times exceeding calyx; lower and middle bracts ovate, cuneate at base, 1.5–2 times as long as calyx, 3–5(7)-lobed, middle lobe lanceolate, elongated, sharply chondroid-pointed, sharply 1–2 chondroid-denticulate, lateral lobes linear, entire or almost sharply chondroid-dentate; upper bracts rhombic in shape, scarcely exceeding calyx, 3-lobed, middle lobe longer, entire or with few fine, sharp chondroid teeth, lateral lobes entire; uppermost bracts entire, lanceolate, equaling calyx, all bracts long-ciliate or somewhat villous at base. Calyx 4–5 × 8–12 mm, with up to 5 mm long pedicels in lower flowers, sessile in middle and upper flowers, tubular-campanulate, herbaceous, somewhat villous, with 5 thick and 5 thin veins without reticulum in between, with oblique throat, 5 subequal teeth; teeth deltoid, lateral teeth sometimes obliquely bent, very sharp, ciliate, entire, chondroid-pointed. Corolla yellow, glabrous, 18–29 mm long; tube erect; galea smoothly projecting, slightly curved, rounded at tip, scarcely exceeding lip; beak conical, longer than broad, bidentate at tip; lip 3-lobed, 8–9 × 12–16 mm, entire or serrate, glabrous or with isolated cilia, lateral lobes transversely oval, middle semiorbicular, truncate at base, 4.5 × 6–7 mm. Filaments of two stamens pilose. Capsule obliquely oblong-ovate, 1.5–2 times as long as calyx. Flowering from June to July. Fruiting from July to August.

On stony and clayey slopes in lower and middle mountain zone.—*Soviet Central Asia*: Dzh.-Tarbagatai, Tien Shan, Pamiro-Alai. *General distribution*: Kashmir, Kuldzha. Described from Dzhabyk Mountain (Dzhungar Ala-Tau). Type in Leningrad.

61. *P. fissa* Turcz. in Bull. phys.-math, Acad. Sc. Pétersb. I (1843) 377; Bge. in Ldb. Fl. Ross. III, 288; Turcz. in Bull. Soc. Nat. Mosc. XXIV, 2, 339; Maxim. in Mém. biol. XII, 903, f. 145.—*P. rubens* var. *alpina* Bge. in Mém. Acad. Sc. Pétersb. diver, sav. II (1835) 571.—*lc.*: Maxim. l.c.

Perennial. Root reduced (?), with scarcely thickened slender fibers. Stem simple, erect, thin, thickset, shining, subglabrous in lower part, with 4 long crispate-hairy lines above, 5–15 cm tall. Radical leaves with glabrous petioles, equaling or up to two times as long as lamina; lamina glabrous, oblong or oblong-lanceolate, twice or almost thrice pinnatisect, segments convergent or with overlapping margins, oblong or ovate; lobes of segments chondroid-pointed, sometimes with 1–2 teeth; cauline leaves 1–2, short-petiolate, reduced, less dissected, with subdeltoid lamina. Flowers short-pedicellate, in few-flowered capitate inflorescence. Lowermost bracts leaflike, middle shorter than flowers, long crispate-hairy at base, deltoid, almost doubly pinnatisect. Calyx tubular-campanulate, almost membranous,

with branched veins, more than 1/3 cleft in front, with long crispate hairs, 14–15 mm long; teeth deltoid, acute, entire, lateral teeth connate for considerable length, several times shorter than tube. Corolla apparently pink with purple galea, 26–28 mm long; tube erect, curved under throat, approximately equaling galea; galea projecting, erect, concave in front, short-beaked, usually with two small projecting and recurved teeth below truncated beak; lip 3-lobed, glabrous, slightly shorter than galea. Filaments of two stamens pilose. Capsule obliquely elongated-oblong, apparently unilaterally dehiscent, about 2 cm long (saw year-old specimen). Flowering from June to July.

In damp alpine meadows.—*Eastern Siberia*: Angara-Sayan, Dauria. *General distribution*: Mongolia. Described from Dauria (Kumyl River?). Isotype in Leningrad.

62. *P. lasiostachys* Bge. in Ldb. Fl. alt. II (1830) 434; in Ldb. Fl. Ross. III, 296; Maxim. in Mém. biol. 12, 908, f. 156; Kryl. Fl. Zap. Sib. X, 2521.—*lc.*: Ldb. Ic. pl. fl. Ross. tab. 340.

Perennial. Root reduced, with slightly thickened (?) fibers. Stems sometimes two, simple, erect, hard, thickset finely, somewhat densely long crispate-hairy, glabrous in lower part, 10–20 cm tall. Radical leaves with subglabrous petioles shorter than lamina; lamina subglabrous or with fine, lax crispate hairs beneath, lanceolate, doubly pinnatisect; lobes linear, short, chondroid-pointed, sometimes with 1–2 teeth; cauline leaves few, reduced, subsessile, otherwise similar. Flowers in elongated, somewhat lax, arachnoid-villous inflorescence, almost equaling stem. Lowermost bracts leaflike, broadened and villous only at base, middle bracts with lanceolate, linear-lobed base, tapering, linear, cristate-lobed at tip, with chondroid-dentate lobes, shorter than flowers. Calyx broadly campanulate, almost membranous, with branched veins, 14–16 mm long, arachnoid-villous; teeth narrowly deltoid, herbaceous and serrate at tip, acute, 1/2 as long as tube. Corolla yellow, 24–26 mm long; tube erect, approximately equaling galea; galea erect, almost hooked at tip, short-beaked, with two recurved teeth; lip 3-lobed, small, glabrous along margin, long clawed, shorter than galea. Filaments of two stamens pilose. Capsule obliquely oblong-lanceolate, mucronate, 16–20 mm long. Flowering from June to July. Fruiting from July to August.

In alpine meadows, on alpine stony slopes.—*Western Siberia*: Altai. *General distribution*: Mongolia, Described from Chuya River. Isotype in Leningrad.

63. *P. flava* Pall. Reise, III (1776) 736, tab. R, f. 1; Bge. in Ldb. Fl. Ross. III, 295; Turcz. in Bull. Soc. Nat. Mosc. XXIV, 2, 344; Maxim. in Mém. biol. XII, 907, f. 153.—*lc.*: Pall. l.c.; Maxim. l.c.

Perennial. Root vertical, stout, branched. Stems usually few, simple, erect or ascending at base, sturdy, thickset, densely crispate-puberulent, (5)10–20 cm tall. Radical leaves numerous, with densely crispate-puberulent petioles,  $\frac{1}{2}$  as long as or equaling lamina; lamina crispate-puberulent or subglabrous, lanceolate, pinnatisect; segments linear-lanceolate, spaced, decurrent on axis, thus appearing winged, with spaced large segments; lobes deltoid or elongated deltoid, acute, sparsely, sharply incised chondroid-dentate; cauline leaves reduced upward, short-petiolate, or upper leaves sessile, otherwise similar. Flowers in dense, slightly elongated, finely villous inflorescence. Lowermost bracts leaflike, middle deltoid, shorter than flowers, pinnately (almost thrice) parted; middle lobe larger, pinnately lobed, lateral lobes linear, entire or few-lobed. Calyx campanulate, subcoriaceous, with prominent herbaceous unbranched veins, tomentulose, 14–18 mm long; teeth narrowly deltoid-lobed, herbaceous, sparsely dentate,  $\frac{1}{2}$ – $\frac{2}{3}$  as long as tube. Corolla yellow, 28–32 mm long; tube erect, slightly shorter than galea; galea slightly falcate (more strongly at tip), short-beaked, with two projecting and slightly recurved teeth under beak; lip large, 3-lobed, glabrous along margin, shortly clawed, almost equaling galea. Filaments of two stamens pilose. Capsule obliquely oblong, hard, about 15 mm long. Flowering from June to July. Fruiting from July to August.

Along stony slopes with steppe vegetation, in saline meadows.—*Eastern Siberia*: Dauria. *General distribution*: Mongolia. Described Onon-Borza River. Isotype in Leningrad.

64. *P. rubens* Steph. ex Willd. Sp. pl. III (1800) 219; Bge. in Ldb. Fl. Ross. III, 290; Turcz. in Bull. Soc. Nat. Mosc. XXIV, 2, 339; Maxim. in Mém. biol. XII, 904, f. 152.—*P. rubens* var. *davurica* Bge. in Mem. Acad. Sc. Pétersb. diver. sav. II (1835) 571.—*P. fischeri* Adams ex Nasaroff in Bull. Soc. Nat. Mosc. XXXII (1923–1924) 355, nom. (cf. Ind. Kew. Suppl. 7).— *Ic.*: Maxim. l.c.— *Exs.*: Karo, Pl. Dahur. No. 74.

761 Perennial. Root reduced, with funiform fibers. Stem simple, thin, thickset, covered with long crispate hairs, often in 4 longitudinal lines, 10–25 cm tall. Radical leaves with long crispate-hairy, rarely glabrous petioles, approximately equaling lamina; lamina glabrous or pubescent above along axis, lanceolate or oblong-lanceolate, twice or almost thrice pinnatisect; segments lanceolate or oblong, lobes of segments overlapping, chondroid-pointed; cauline leaves 1–2, with shorter petioles, otherwise similar. Flowers sessile, or lowermost subsessile, in oblong, dense inflorescence, interrupted in lower part in fruit. Lowermost bracts leaflike, middle shorter than flowers, long crispate-hairy or subglabrous, deltoid, almost flabellately pinnatipartite, lobes linear, entire or with spaced slender lobules, middle lobe larger, pinnatipartite. Calyx tubular-campanulate,



long crispate-hairy or subglabrous, almost membranous, with branched veins, 14–15 mm long,  $1/3$ – $1/2$  cleft in front; teeth deltoid-linear, very sharp, entire or sharply toothed,  $2/5$ – $1/2$  as long as tube. Corolla pink, 22–28 mm long; tube erect, approximately equaling galea; galea scarcely projecting, falcate at tip, short-beaked, with projecting and recurved teeth; lip 3-lobed, glabrous, very shortly clawed, slightly shorter than galea. Filaments of two stamens pilose. Capsule obliquely lanceolate, sometimes recurved at tip, 14–16 mm long. Flowering from June to July. Fruiting from July to August (Plate XXXIX, fig. 3).

Along slopes in steppe and open forests.—*Eastern Siberia*: Lena-Kolyma, Angara-Sayan (eastern part), Dauria. *General distribution*: Mongolia. Described from “Central Siberia”. Isotype in Leningrad.

65. *P. achilleifolia* Steph. in Willd. Sp. pl. III (1800) 219; Bge. in Ldb. Fl. Ross. III, 294; Turcz. in Bull. Soc. Nat. Mosc. XXIV, 2, 343; Maxim. in Mém. biol. XII, 908, f. 157; Kryl. Fl. Zap. Sib. X, 2520.—*lc.*: Ldb. Ic. pl. fl. Ross. tab. 446.

Perennial. Root reduced, with fusiform thickened fibers. Stems 1–several, simple, erect, hard, densely crispate-pilulose, 10–40 cm tall. Radical leaves numerous, with petioles  $1/3$ – $1/2$  as long as lamina; lamina pubescent similarly to stem, lanceolate, 2–3-pinnatisect; segments linear, short, chondroid-pointed; cauline leaves alternate, reduced upward, somewhat gradually transformed into bracts, short-petiolate, upper leaves sessile. Flowers on short pedicels in dense, elongated, finely villous, up to 25 cm long inflorescence. Lowermost bracts leaflike, middle approximately equaling calyx, 3-lobed, middle lobe large, chondroid-serrate at tip. Calyx campanulate, slightly inflated, herbaceous, with prominent, finely branched, but not anastomosed veins, 14–15 mm long; teeth narrowly  
762 deltoid, very sharp, entire or serrate,  $1/2$  as long as tube. Corolla yellow, 24–28 mm long; tube erect, at least  $2/3$  as long as galea; galea erect, falcate at tip, short-beaked, bidentate, teeth projecting and recurved; lip 3-lobed, glabrous, shorter than galea. Filaments of two stamens pilose. Capsule 12–15 mm long, narrowly oblong, symmetrical, gradually tapering into beak. Flowering from May to July. Fruiting from June to August.

On stony steppe slopes.—*Western Siberia*: Irtysh, Altai; *Eastern Siberia*: Angara-Sayan (western part); *Soviet Central Asia*: Dzhetysay. *General distribution*: Mongolia. Described from Siberia. Isotype in Leningrad.

66. *P. talassica* Vved. in Journ. Turk. Branch Russ. Geogr. Soc. XVI (1923) 139 (nomen) and in Addenda XXI, 814.—*P. achilleifolia* auct. fl. As. Med. p.p.—*Exs.*: HFAM, No. 171 (sub *P. dubia*).

Perennial. Root fibrous, with weakly thickened fibers. Stems 1–3, erect, hard somewhat villous, 10–45 cm tall. Radical leaves with villous petioles  $1/2$  as long as lamina; lamina lanceolate, pinnatisect; segments oblong-lanceolate or ovate, pinnatipartite with chondroid-dentate lobes; middle leaves short-petiolate, upper sessile. Inflorescence 5–30 cm long, compact, lower flowers sometimes spaced, with pedicels sometimes up to 12 mm long. Lower bracts similar to upper leaves; upper bracts trisected, rhombic in shape. Calyx 14–20 mm long, tubular-campanulate, yellowish villous, unequally 5-toothed; lateral teeth with deltoid base, lanceolate, with chondroid spinule at tip, chondroid-denticulate; posterior tooth entire, deltoid, shorter. Corolla yellow, glabrous or pubescent, 23–25 mm long, with erect, broad tube, slightly longer than calyx tube; galea projecting, slightly falcate, with two teeth in front under tip; lip 3-lobed,  $2/3$  as long as galea, sometimes ciliate at base, with rounded middle lobe. Stamens with glabrous filaments or two pilose. Capsule obliquely oblong-ovate, 18–20 mm long. Flowering from June to July. Fruiting from July to August.

On stony and clayey stony slopes in high-mountain zone.—*Soviet Central Asia*: Tien Shan (Talas and Tashkent Ala Tau). Described from Bolshoi Chingan. Type in Tashkent.

67. *P. krylovii* Bonati in Bull. Soc. Bot. Fr. LXI (1914) 232.—*P. achilleifolia* auct. fl. As. Med. p.p.

763 Perennial. Root fibrous, with weakly thickened fibers. Stems 1–2, suberect, somewhat villous, 18–25 cm tall. Radical leaves lanceolate, glabrous or with isolated hairs above, scattered crispate-hairy beneath along midrib and petiole, doubly pinnatisect with chondroid-dentate segments; middle leaves short-petiolate, with denser pubescence, upper leaves sessile. Inflorescence interrupted in lower part, 12–15 cm long. Lowermost bracts similar to upper leaves, others rhombic, deeply 3-lobed, with elongated chondroid-dentate middle lobe. Calyx 14–15 mm long, cylindrical, glabrous along with teeth, sometimes somewhat villous beneath along veins, unequally 5-toothed; lateral teeth deltoid, entire, chondroid-pointed,  $\frac{2}{5}$  as long as tube; upper tooth deltoid, slightly broader and shorter than lateral teeth. Corolla yellow, 27–28 mm long, glabrous, with erect, broad tube almost equaling calyx; galea projecting, slightly falcate, with two teeth under tip; lip 3-lobed, slightly shorter than galea, with transversely oval middle lobe. Filaments of two stamens pilose. Capsule elongated oblong, exserted from calyx. Flowering in June. Fruiting in July.

On stony and rubbly slopes in middle and high-mountain zone.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from Alai Valley. Type in Leningrad.

68. *P. dubia* B. Fedtsch. in Trav. Mus. Bot. Acad. Sc. Pétersb. (1902) 255.

Perennial. Root vertical, with thick branches. Stems single or 2–3, simple, erect, rather thickset, densely long crispate-hairy, 10–25 cm tall. Radical leaves numerous, with long crispate-hairy petioles 1/2 as long as lamina; lamina glabrous above, with long crispate hairs beneath, lanceolate, pinnatisect; segments slightly spaced, lanceolate or oblong, pinnatipartite or deeply pinnately lobed, chondroid-pointed; lobes of segments few, chondroid-pointed, unilaterally sparsely serrate; cauline leaves few, reduced upward, gradually transforming into bracts; lower leaves petiolate, upper sessile. Flowers on short pedicels, in dense, somewhat villous inflorescence, lax, oblong or elongated in fruit. Lowermost bracts leaflike, middle 3-partite; middle lobe shorter, chondroid-dentate at tip. Calyx campanulate, almost herbaceous, with prominent veins forming fine reticulum, 16–18 mm long; teeth narrowly deltoid, acute, often sparsely dentate, 1/2–2/3 as long as tube. Corolla yellow, with violet lip, 28–30 mm long; tube erect, approximately equaling galea; galea projecting, falcate above, short-beaked, bidentate; lip small, 3-lobed, serrate, glabrous or sparsely ciliate, much shorter than galea. Stames with glabrous filaments or two somewhat pilose. Capsule oblong-lanceolate, long tapering above, 764 subsymmetrical, 15–17 mm long. Flowering from June to July. Fruiting from July to August.

In subalpine steppes and in subalpine meadows.—*Soviet Central Asia*: Pamiro-Alai (Karategin Range, Shugnan). Described from valley of Toguzbulak River. Type in Leningrad.

69. *P. kaufmannii* Pinzger in Progr. Sald. Realsch. Brandenb. (1968) 17, tab. 1.—*P. comosa* auct. Fl. ross. p.p.—*l.c.*: Pinzger, l.c.—*Exs.*: Herb. Fl. Ross. No. 732. (sub *P. comosa*).

Perennial. Root short, with fusiform thickened fibers. Stem usually single, simple, erect, hard, densely finely crispate-hairy, 20–40 cm tall. Radical leaves with densely crispate-puberulent petioles slightly shorter than or up to 1/2 as long as lamina; lamina long crispate-hairy along axis and veins beneath and besides, densely patently tomentulose, rarely subglabrous, lanceolate, pinnatisect; segments oblong or ovate, lower spaced, upper overlapping, pinnatipartite, chondroid-pointed; lobes of segments chondroid-pointed, unilaterally sparsely serrate; cauline leaves reduced upward, very gradually transformed into bracts, lower leaves short-petiolate, upper sessile, cristate-pinnatipartite. Flowers subsessile in dense elongated inflorescence. Lower bracts leaflike, longer than flowers, middle 3-partite, with middle lobe much larger, cristate-lobed. Calyx campanulate, 13–15 mm long, almost herbaceous, with prominent finely branched veins forming reticulum, long crispate-hairy or rarely glabrous; teeth very



short, broadly deltoid, several times shorter than tube. Corolla yellow, 25–28 mm long; tube erect, approximately equaling galea; galea erect, smoothly and weakly falcate from base, strongly at tip, short-beaked, bidentate; lip 3-lobed, serrate, ciliate, slightly shorter than galea. Filaments of two stamens pilose. Capsule obliquely oblong, somewhat tapering above, 15–18 mm long. Flowering from June to July. Fruiting from July to August.

In meadows, among scrub, in steppe meadows.—*European USSR*: Baltic Region, Upper Volga, Upper Dnieper, Middle Dnieper, Volga-Don, Trans-Volga Region, Black Sea Region, Lower Don, Urals; *Caucasus*: Ciscaucasia. *Western Siberia*: Upper Tobol, Irtysh (western part). Endemic. Described from Pakhra River. Type in Berlin?

70. *P. acmodonta* Boiss. Diagn. pl. or. nov. I ser. IV (1844) 84; Grossh. Fl. Kavk. III, 402.—*P. comosa* var. *acmodonta* Boiss. Fl. or. IV (1879) 492 (pro max. part.).

765 Perennial. Root reduced, with fusiform thickened fibers. Stem erect, simple, stout, sulcate, glabrous or crispate-hairy along grooves, 20–50 cm tall. Radical leaves with glabrous petioles shorter than lamina; lamina glabrous, pinnatisect; segments spaced in lower part, closer above, oblong, remotely pinnatipartite; lobes of segments unequally serrate, intensely chondroid-margined; cauline leaves gradually reduced upward, with shorter petioles, upper leaves sessile, otherwise similar. Lower flowers on up to 5 mm long pedicels, upper sessile, in dense elongated inflorescence, interrupted (sometimes intensely) in lower part. Lowermost bracts leaflike, usually longer than flowers, middle bracts shorter than calyx, glabrous or long crispate-hairy, 3-lobed or entire, oblong; lobes chondroid-serrate at tip, middle lobe slightly larger. Calyx tubular-campanulate, subcoriaceous, with branched veins, glabrous or long crispate-hairy beneath, 12–14 mm long; teeth broadly deltoid, crispate-ciliolate, entire, chondroid-mucronate, several times shorter than tube. Corolla yellow, 30 mm long, with erect tube, approximately equaling galea; galea scarcely projecting, falcate (strongly above), short-beaked, bidentate; lip large, 3-lobed, glabrous along margin, long clawed, sparsely pilose in throat, approximately equaling galea. Filaments of two stamens pilose. Capsule ovate, symmetrical, gradually tapering, 12–14 mm long. Flowering in June. Fruiting in July.

On mountain slopes.—*Caucasus*: southern Transcaucasia. *General distribution*: Iran, Armenia-Ķurdistan. Described from Cappadocia and northern Iran. Isotype in Leningrad.

71. *P. daghestanica* Bonati in Bull. Soc. Bot. Geneve, V (1913) 36; Grossh. Fl. Kavk. III, 402.

Perennial. Root reduced, with fusiform thickened fibers. Stem simple, erect, stout, covered with fine, long crispate hairs, often subglabrous, 30–60 cm tall. Radical leaves with long crispate-hairy, sometimes villous petioles,  $1/3$ – $1/2$  as long as lamina; lamina glabrous above, sometimes densely pilulose beneath, linear-lanceolate, pinnatisect; segments deltoid-oblong, truncate, deeply incise pinnatilobate, slightly spaced; lobes of segments chondroid-pointed, chondroid-margined, serrulate; cauline leaves numerous, gradually reduced upward, lower leaves short-petiolate, upper sessile and often with enlarged pair of lower segments, less dissected, otherwise similar. Flowers sessile or subsessile, in oblong or elongated inflorescence. Lowermost bracts leaflike, middle longer than calyx, long crispate-hairy at base, 3-partite; lobes chondroid-crispate-lobed, lateral  
 766 lobes reduced. Calyx narrowly campanulate, 10–12 mm long, subcoriaceous, with branched veins, finely long crispate-hairy; teeth 3-partite, acute, several times shorter than tube. Corolla yellow, 28–32 mm long; tube erect, slightly shorter than galea; galea often purple at tip, weakly falcate above, short-beaked, bidentate; lip large, 3-lobed, pilose in throat, glabrous or scarcely ciliate along margin, scarcely shorter than galea. Filaments of two stamens pilose. Capsule oblong-ovate, subsymmetrical, gradually tapering into short curved beak, 15–18 mm long. Flowering from May to June. Fruiting from June to July.

Along steppe slopes, forest edges from foothills to middle mountain zone.—*Caucasus*: Ciscaucasia, Dagestan. Endemic. Described from Betl.

*Note.* Having neither the holotype nor an isotype of this species at my disposal, I am referring to this species, with some reservation, this plant that is common on the north slope of the Main Range. I must note, however, that I have never observed such narrow and dentate calyx teeth in any Caucasian plant from the *E. comosa* s. l. complex which Bonati places in his *P. daghestanica*.

72. *P. sibthorpii* Boiss. Diagn. pl. or. nov. I ser. IV (1844) 83; Grossh. Fl. Kavk. III, 402 (p.p.)—*P. comosa* var. *sibthorpii* Boiss. Fl. or. IV (1879) 492.

Perennial. Root reduced, with fusiform thickened fibers. Stem simple, erect, hard, long crispate-hairy, 20–30 cm tall. Radical leaves with densely long crispate-hairy or villous petioles,  $1/3$ – $1/2$  as long as lamina; lamina glabrous above, with long crispate hairs beneath, pinnatisect; segments oblong or ovate in shape, somewhat spaced, incise-pinnatipartite; lobes of segments very acute, chondroid-pointed, regularly coarsely sharp chondroid-serrate; cauline leaves few, reduced upward, with shorter petioles, upper leaves sessile. Flowers sessile or subsessile, in oblong or elongated, usually villous inflorescence; hairs on inflorescence comparatively coarse, distinctly flattened. Lowermost bracts leaflike, middle

slightly longer than calyx, 3-partite, middle lobe larger, often dentate at tip. Calyx tubular-campanulate, 12–13 mm long, subcoriaceous, with branched veins, long crispate-hairy, often almost villous; teeth shortly deltoid, acute, sometimes mucronate, several times shorter than tube. Corolla yellow, 27–28 mm long; tube erect, slightly shorter than galea; galea scarcely projecting, falcate at tip, short-beaked, bidentate; lip large, 3-lobed, pilose in throat, glabrous or scarcely ciliate along margin, long clawed, approximately equaling galea. Filaments of two stamens pilose. Capsule obliquely oblong, slightly curved at tip, almost beakless, 16–18 mm long. Flowering from May to June. Fruiting from July to August.

In open forests, on grassy slopes.—*European USSR*: Crimea; *Caucasus*: western and southern Transcaucasia. *General distribution*: Asia Minor. Described from Bithynian Olympus. Isotype in Leningrad.

73. *P. chroorrhyncha* Vved. sp. nov. in Addenda XXI, 815.—*P. comosa* auct. fl. cauc. p.p.—*P. sibthorpii* auct. fl. cauc. p.p.

Perennial. Root reduced with fusiform thickened fibers. Stem simple, erect, slender, short, long crispate-hairy, 5–15 cm tall. Radical leaves with villous petioles, 1/3–1/2 as long as lamina; lamina glabrous or subglabrous above, somewhat densely long crispate-hairy beneath, lanceolate, pinnatisect; segments spaced in lower part, closer above, oblong or ovate, pinnatipartite or deeply pinnately lobed, chondroid-pointed; lobes of segments chondroid-pointed, elongated deltoid, entire or with 1(3) teeth; cauline leaves 1–2, with shorter petioles or sessile, reduced, otherwise similar. Flowers sessile or subsessile in capitate or oblong, somewhat finely villous inflorescence. Lowermost bracts leaflike, middle slightly longer than calyx, pinnatipartite; lower lobes linear, entire, middle much larger, chondroid crispate-lobed. Calyx tubular-campanulate, subcoriaceous, with branched veins, long slender crispate hairs, 13–18 mm long; teeth broadly deltoid, acute, entire, several times shorter than tube. Corolla yellow, with purple tinged galea tip (teeth colored), 30–38 mm long; tube erect, approximately equaling galea, with two hairy lines at throat angles; galea slightly projecting, falcate above, short-beaked, bidentate; lip large, 3-lobed, serrate and ciliate along margin, pilose in throat, scarcely shorter than galea. Filaments of two stamens pilose. Flowering in July.

In alpine and subalpine meadows.—*Caucasus*: Ciscaucasia, Dagestan, western Transcaucasia (northern part). Endemic. Described from Ullugulu. Type in Leningrad.

74. *P. sibirica* Vved. sp. nov. in Addenda XXI, 816.—*P. comosa* auct. fl. Sib.

Perennial. Root short, with long fusiform thickened fibers. Stems usually single, rarely two, simple, erect, usually thickset, very finely



crispate-hairy, (10)20–40(50) cm tall. Radical leaves with finely crispate-hairy petioles 1/2 as long as lamina; lamina glabrous above, long crispate-hairy beneath along veins, lanceolate, pinnatisect; segments distantly spaced in lower part, overlapping or touching above, elongated, patently deeply pinnatifid, chondroid-pointed; lobes of segments chondroid-pointed, distantly, unequally chondroid-serrate; cauline leaves gradually reducing upward, usually spaced in lower part, few, crowded above as if covering inflorescence; lower leaves short-petiolate, upper sessile, less dissected. Flowers sessile, in very compact oblong inflorescence. Lowermost bracts leaflike, middle bracts sharply dissected, oblong-lanceolate or lanceolate, arachnoid-hairy, entire or few-lobed, shorter than calyx. Calyx campanulate, 11–14 mm long, subcoriaceous, with prominent, finely and shortly branched veins, glabrous or arachnoid-hairy, with very short, broadly deltoid teeth, several times shorter than tube. Corolla yellow, 26–28 mm long; tube erect, slightly shorter than galea; galea scarcely projecting, smoothly and weakly falcate from base, sharply so above, short-beaked and bidentate; lip long clawed, ciliate, 3-lobed, approximately equaling galea. Filaments of two stamens pilose. Capsule obliquely oblong, with somewhat recurved tip, 10–11 mm long, enclosed in calyx. Flowering from June to July. Fruiting from July to August.

In meadows, open forests.—*European USSR*: Urals (?); *Western Siberia*: Altai; *Eastern Siberia*: Angara-Sayan. Endemic. Described from vicinity of village of Sonskoe. Type in Leningrad.

75. *P. uralensis* Vved. sp. nov. in Addenda XXI, 816.—*P. comosa* auct. fl. Ross. p.p.

Perennial. Root short with weakly fusiform thickened fibers. Stems usually single, rarely 2–3, simple, erect, tall, finely crispate-hairy, 30–80 cm tall. Radical leaves with long crispate-hairy or glabrous petioles equaling or 1/2 as long as lamina; lamina glabrous or often long crispate-hairy beneath, linear-lanceolate, pinnatisect; segments spaced in lower part, overlapping above, unequally pinnatifid, chondroid-pointed; lobes of segments patent, chondroid-pointed, chondroid-lobed-dentate; cauline leaves gradually reducing upward, lower leaves short-petiolate, upper sessile, bractlike, less dissected. Flowers sessile, in elongated, dense, long crispate-hairy inflorescence, becoming lax in lower part in fruit.

769 Lowermost bracts similar to upper leaves, middle lanceolate, tapering and usually chondroid-serrate at tip, slightly longer than calyx. Calyx campanulate, subcoriaceous, with prominent, finely and shortly branched veins, long crispate-hairy, 10–11 mm long, with very short, broadly deltoid, entire teeth several times shorter than tube. Corolla yellow, 22–28 mm long; tube erect, at least 2/3 as long as galea; galea slightly projecting, usually smoothly and weakly falcate from base, sharply so at

tip, short-beaked, bidentate; lip shortly clawed, ciliate, 3-lobed, slightly shorter than galea. Filaments of two stamens pilose. Capsule obliquely oblong, abruptly tapering above, usually with recurved or hooked tip, 9–12 mm long. Flowering from June to July. Fruiting from July to August.

In meadows, birch and aspen groves—*European USSR*: Dvina-Pechora, Upper Volga, Volga-Kama, Volga-Don, Urals; *Western Siberia*: Ob' Region (southern part), Upper Tobol (northern part), Irtysh (northern part). Endemic. Described from vicinity of village of Purino. Type in Leningrad.

76. *P. venusta* Schangin ex Bge. in Bull. Acad. Sc. Pétersb. VIII (1841) 252 (nomen); In Bull. phys.-math. Acad. Sc. Pétersb. I, 380; Bge. in Ldb. Fl. Ross. III, 293; Turcz. in Bull. Soc. Nat. Mosc. XXIV, 2, 342; Maxim. in Mém. biol. XII, 906 (excl. var. and fig.); Kryl. Fl. Zap. Sib. X, 2519.—*P. comosa* var. *venusta* Bge. in Mém. Acad. Sc. Pétersb. diver. sav. II (1835) 570.—*Exs.*: Karo, Pl. Dahur. No. 177; Karo, Pl. Amur. and Zaeen. No. 112.

Perennial. Root reduced, with funiform fibers. Stem usually single, erect, simple, usually slender, finely long crispate-hairy, (10)20–30(40) cm tall. Radical leaves with finely long crispate-hairy petioles, equaling or 1/2 as long as lamina; lamina glabrous above, with long crispate hairs beneath along veins, lanceolate, pinnatisect; segments spaced, oblong, elongated, finely chondroid-pointed, deeply pinnatipartite; lobes of segments finely chondroid-pointed, chondroid-serrulate; cauline leaves gradually reducing upward, lower leaves short-petiolate, similar to radical leaves, upper intensely reduced, less dissected. Flowers subsessile, in dense oblong or elongated inflorescence, usually with coarse, long crispate hairs. Lowermost bracts similar to upper leaves, middle pinnately 3–5-lobed; middle lobe larger, chondroid-serrulate or entire at tip, approximately equaling calyx. Calyx campanulate, 8–10 mm long, subcoriaceous, with prominent, finely and shortly branched veins, almost  
770 1/3 cleft in front; teeth short, broadly deltoid, several times shorter than tube. Corolla yellow, 20–25 mm long; tube erect, slightly shorter than galea; galea scarcely projecting, falcate above, short-beaked, bidentate; lip 3-lobed, glabrous along margin, slightly shorter than galea. Filaments of two stamens pilose. Capsule obliquely oblong, long tapering at tip, 10–12 mm long. Flowering from June to July. Fruiting from July to August.

In meadows, often alkaline.—*Western Siberia*: Altai; *Eastern Siberia*: Lena-Kolyma (?), Angara-Sayan, Dauria; *Soviet Far East*: Zeya-Bureya. *General distribution*: Mongolia. Described from several places in Central Siberia. Isotype in Leningrad.

*Note.* In Chuiskaya Steppe and in some places in Mongolia, hybrids of this species with *P. altaica* are common, which makes it difficult to differentiate them.

Plants from the Lena-Kolyma Region are distinguished by the calyx being more deeply cleft in front, its lateral teeth being long connate, usually without an intermediate thin vein. These need further study.

77. *P. schistostegia* Vved. sp. nov.—*P. venusta* var. Maxim. in Mél. biol. XII, 906, f. 148.—*P. venusta* var. *schmidtii* Nakai in Tok. Bot. Mag. XXIII (1909) 101; Sugawara, Illustr. fl. Sagh. IV. 1669, tab. 766.—*!c.*: Sugawara, *!c.*

Perennial. Root apparently reduced with funiform fibers. Stems 1–3, simple, straight or slightly twisted, slender, thickset, densely crispate-hairy, almost villous, 10–20 cm tall. Radical leaves numerous, with densely crispate-hairy, almost villous petioles approximately equaling lamina; lamina glabrous above, crispate-hairy beneath, especially along axis, oblong-lanceolate, pinnatisect; segments spaced in lower part, overlapping above, oblong, very deeply pinnatifid, almost pinnatisect; lobes of segments decurrent, chondroid-pointed, regularly chondroid-serrate; cauline leaves 3–4, abruptly reduced upward, with shorter petioles (upper leaves sessile), less dissected, otherwise similar. Flowers sessile, or lower subsessile; inflorescence dense, oblong, up to 10 cm long in fruit. Lowermost bracts leaflike, middle longer than calyx, pinnatisect; lower segments linear, middle larger, pinnately lobed. Calyx narrowly campanulate, almost herbaceous, with 5 prominent veins and finer reticulum in between, densely crispate-hairy, up to almost 1/2 cleft in front; teeth 771 deltoid, acute, entire, lateral teeth almost 1/2 connate, 1/3 as long as tube. Corolla white, 26–28 mm long; tube erect, slightly curved under throat, almost equaling galea; galea slightly (more strongly above) falcate, short-beaked, bidentate; lip large, 3-lobed, pilose in throat, slightly shorter than galea. Filaments of two stamens pilose. Capsule obliquely oblong, 12–15 mm long (year-old specimens). Flowering from June to July.

On rocks.—*Soviet Far East*: Sakhalin. *General distribution*: Japan. Described from Manne. Type in Leningrad.

78. *P. altaica* Steph. ex Stev. in Mém. Soc. Nat. Mosc. VI (1823) 48 in obs. tab. 14 A; Bge. in Ldb. Fl. Ross. III, 292; Maxim. in Mél. biol. XII, 904; Kryl. Fl. Zap. Sib. X, 2516.—*!c.*: Ldb. *!c.* pl. F. Ross. tab. 442.

Perennial. Root reduced, with thick, sometimes branched, funiform fibers. Stem generally single, simple, slender, generally flexuous, very finely sparsely long crispate-hairy, often colored, 20–40 cm tall. Radical leaves few, with glabrous petioles 1/2 as long as lamina; lamina glabrous,



linear-lanceolate, with narrowly winged axis, pinnatisect; segments spaced, oblong-lanceolate or lanceolate, obtuse, shortly chondroid-pointed, large-lobed; lobes of segments obtuse, shortly chondroid-pointed; cauline leaves abruptly reduced upward, short-petiolate, or upper sometimes sessile; lower leaves pinnatipartite, upper cristate-lobed, usually with larger lobes at base. Flowers short-pedicellate, in elongated inflorescence, lax in lower part. Bracts 3-lobed, lateral lobes reduced (toothlike in middle bracts), middle elongated, chondroid-serrate; lowermost bracts sometimes longer than calyx, middle shorter. Calyx narrowly campanulate, 10–12 mm long, subcoriaceous, with prominent, finely and shortly branched veins, glabrous with purple spots or gray-tomentose, with shortly deltoid teeth several times shorter than tube. Corolla yellow, 25–27 mm long; tube scarcely curved under throat, equaling galea; galea erect, falcate at tip, short-beaked, bidentate; lip long clawed, somewhat ciliate along margin, 3-lobed, equaling galea. Filaments of two stamens pilose. Capsule subsymmetrical, oblong, with very short beak, about 10 mm long. Flowering from June to July. Fruiting from July to August.

In alkaline meadows, in osier scrubs. *Western Siberia*: Altai; *Soviet Central Asia*: Balkhash Region (?) *General distribution*: Mongolia. Described from Altai. Diagram in Steven's monograph cited above is made from specimen in herbarium of Helsinki University (!).

- 772 79. *P. mariae* Rgl. in Tr. Peterb. bot. sada VI (1880) 351.—*P. altaica* (non Steph.) Maxim. in Mém. biol. XII, 908, f. 147.—*lc.*: Maxim. l.c.

Perennial. Root reduced, with funiform fibers. Stems 1–4, simple, erect or ascending at base, glabrous or sometimes sparsely crispate-hairy, 15–40 cm tall. Radical leaves with glabrous or crispate-hairy petioles 1/2 as long as lamina; lamina with winged axis, glabrous or pubescent beneath along veins, pinnatisect; segments oblong-lanceolate, subobtusely, chondroid-pointed, lobed; lobes chondroid-pointed, chondroid-dentate; cauline leaves very abruptly reduced upward, short-petiolate, or upper leaves sessile, lower somewhat similar to radical leaves, upper cristate-lobed, pinnatisect at base. Flowers pedicellate in oblong, lax, arachnoid-villous inflorescence, elongated in fruit. Bracts almost equaling calyx, pinnately 3–5 lobed, with middle lobe elongated, chondroid-serrate in lower bracts. Calyx narrowly campanulate, subcoriaceous, with prominent, finely and shortly branched veins, 11–18 mm long, somewhat deeply cleft in front; teeth broadly deltoid, entire, several times shorter than tube. Corolla erect, 21–30 mm long; tube erect or slightly curved under throat, equaling galea; galea erect, falcate at tip, short-beaked, bidentate; lip long clawed, glabrous along margin, 3-lobed, equaling galea. Filaments of two stamens pilose. Capsule 13–15 mm long, obliquely oblong or obliquely

oblong-lanceolate, with very short beak. Flowering from May to August. Fruiting from June to September.

In saline meadows, riparian forests.—*Soviet Central Asia*: Balkhash Region (valley of Ili River), Tien Shan (valley of Kegen River). *General distribution*: Kuldzha. Described from valley Kegen River (Trulyanboi) and valley of Ili River (Kuldzha). Type in Leningrad.

80. *P. schugnana* B. Fedtsch. in Trav. Mus. Bot. Acad. Sc. Pétersb. I (1902) 156.

Perennial. Root reduced, with thick funiform fibers. Stems 1—several, simple, well-formed, erect or ascending at base, glabrous or with long, fine crispate hairs under inflorescence and along its axis, 25–40 cm tall. Radical leaves with glabrous petioles 1/2 as long as lamina; lamina glabrous, linear-lanceolate, with broad winged axis, pinnatisect; segments oblong or ovate, obtuse, chondroid-pointed, finely lobed; lobes obtuse, chondroid-margined, chondroid-tipped; cauline leaves abruptly reduced upward, 773 short-petiolate or upper leaves sessile, long crispate-ciliate at base; lower leaves somewhat similar to radical leaves, upper cristate-lobed, pinnatisect at base. Flowers with very short pedicels, in somewhat long inflorescence slightly lax in lower part. Lowermost bracts similar to upper cauline leaves, middle bracts approximately equaling calyx, 3-lobed, with lateral lobes reduced, sometimes toothlike, middle lobe elongated, serrate. Calyx narrowly campanulate, 13–15 mm long, subcoriaceous, with prominent, finely and shortly branched veins, glabrous or finely long crispate-hairy, slightly deeply cleft in front, teeth deltoid, longer than broad, several times shorter than tube. Corolla yellow, 25–28 mm long; tube erect, equaling galea; galea slightly projecting, falcate above, short-beaked, bidentate; lip long clawed, glabrous along margin, 3-lobed, equaling galea. Filaments of two stamens pilose. Capsule obliquely oblong, almost beakless, 12–14 mm long. Flowering from July to August. Fruiting from August to September.

In boggy meadows.—*Soviet Central Asia*: Pamiro-Alai (Shugnan). Endemic. Described from valley of Pyandzh River. Type in Leningrad.

Series 13. *Sylvaticae* Vved.—Biennials or perennials, with vertical branched root. Stem branched. Rosette leaves entire, incise-dentate-lobed at tip; cauline leaves alternate, pinnatisect. Galea scarcely falcate, almost beakless, bidentate at tip.

81. *P. sylvatica* L. Sp. pl. (1753) 607; Bge. in Ldb. Fl. Ross. III, 284; Maxim. in Mém. biol. X, 112.—*P. procumbens* Gilib. Exerc. phytol. I (1792) 135.—*lc.*: Hegi, Illustr. Fl. Mittel-Eur. f. 69 a–f.—*Exs.*: Fl. exs. austro-hung. No. 2115; Pl. pol. exs. No. 256.

Biennial or perennial. Plant glabrous. Root vertical, branched. Stem branched only at base, rarely also above, with ascending or

- partially ascending branches, 5–15 cm tall. Radical leaves in compact rosette, reduced, oblong, sessile, entire or incise-dentate-lobed at tip; cauline leaves alternate, short-petiolate, gradually reduced upward, linear-elliptical, pinnatisect; segments spaced in lower part, crowded above, broadly oblong, chondroid-lobed. Flowers short-pedicellate in axils of sessile floral leaves, forming racemose inflorescences on stem and branch ends, often sparse in latter. Calyx herbaceous, with reticulate venation, tubular-campanulate, 12–14 mm long, cleft almost up to 1/2 in front; teeth deltoid, acute, dentate, densely crispate-ciliolate, 1/3 as long as tube.
- 774 Corolla pink, 20–26 mm long; tube erect, slightly exceeding calyx; galea scarcely falcate (strongly so at tip), almost beakless, bidentate at tip; lip 3-lobed, large, broader than long, at least 2/3 as long as galea. Filaments of two stamens pilose-villous. Capsule obliquely broadly oblong, abruptly narrowed into short beak, sometimes diverging sideways. Flowering from June to July. Fruiting from July to August.

In marshes and damp meadows.—*European USSR*: Upper Dniester. *General distribution*: Western Europe. Described from Europe. Type in London.

Section 4. *Pharyngodon* Bge. in Ldb. Fl. Ross. III (1847–1849) 268.—Leaves alternate. Galea with two obtuse teeth under throat and sometimes with two more obtuse teeth under tip.

Series 1. *Aduncae* Vved. Annuals. Galea beaked with two slender, projecting teeth.

82. *P. adunca* M.B. ex. Stev. in Mém. Soc. Nat. Mosc. VI (1823) 29, tab. 5, f. 2; Bge. in Ldb. Fl. Ross. III, 282; Maxim. in Mém. biol. XII, 901, f. 138.—*P. palustris* var. Willd. Sp. pl. III (1800) 203.—*P. rubinskii* Kom. in Fedde, Repert. sp. nov. XIII (1914) 236.—*P. sachalinensis* Miabe and Miyake, Fl. Sagh. (1915) 355.—*P. sphagnicola* Kom. Fl. Kamch. III (1930) 76 and herb.—*P. parviflora* (non Smith) Kom. l.c. 84 (excl. syn. Stev. and Bge.).—*Ic.*: Sugawara, Illustr. Fl. Sagh. IV, tab. 765 (sub *P. sachalinensis*).

Annual. Plant glabrous. Stem erect or often branched from base or middle, with spreading or almost patent branches, (5)10–20(40) cm tall. Radical leaves in rosette reduced, entire, sublinear, obversely oblong or subspatulate, gradually narrowed toward base, subsessile, entire or dentate at tip; cauline leaves alternate, narrowly linear-lanceolate or narrowly linear-deltoid, deeply pinnatifid or almost pinnatisect; segments oblong or subdeltoid in upper leaves, dentate, involute along margin, sometimes appearing entire. Flowers solitary, short-pedicellate, in axils of upper leaves. Calyx campanulate, herbaceous, 6–9 mm long, bilobed (deeper cleft at back), lobes almost semicircular or subdeltoid, ciliolate, entire or somewhat dentate. Corolla pinkish violet, 16–18 mm long; tube erect,



775 equaling or 1.5 times as long as calyx; galea slightly falcate, with deltoid tooth on either side above throat, gradually transformed into curved, obliquely truncate beak, ending into two slender, projecting teeth; lip 3-lobed, large, somewhat ciliate, slightly exceeding galea. Filaments of two stamens pilose. Capsule about 10–12 mm long, obliquely oblong, somewhat gradually tapering, with beak diverging sideways. Flowering from July to September. Fruiting from August to September.

In sphagnum marshes and wet meadows.—*Arctic Region*: Anadyr; *Soviet Far East*: Kamchatka, Okhotsk, Zeya-Bureya, Ussuri, Sakhalin. Endemic. Described from Kamchatka. Type in Leningrad.

Series 2. *Palustres* Vved.—Annuals or biennials. Galea beakless or almost so, without teeth under tip or with erect teeth.

83. *P. palustris* L. Sp. pl. (1753) 607; Bge. in Ldb. Fl. Ross. III, 283 (p. min. p. excl. var. *wlassowiana* and spec. Ross. europ. orient. Sibir. and Amer.); Grossh. Fl. Kavk. III, 402.—*P. erecta* Gilib. Exerc. phytol. I (1792) 135.— *Ic.*: Rchb. Ic. fl. Germ. tab. 1749, f. 2.— *Exs.*: Fl. Stir. exs. No. 1057; Herb. norm. No. 4921; Fl. exs. austro-hung. No. 2113.

Biennial. Stem usually branched, with upright branches, glabrous or with scattered long crispate hairs, 20–50 cm tall. Radical leaves in rosette extremely reduced, oblong, entire; cauline leaves alternate, reduced upward, subsessile, long ciliate at base, linear-lanceolate, pinnatisect; segments entire, somewhat spaced, obtuse, deeply pinnately crenate-lobed; lobes chondroid-dentate at tip. Flowers short-pedicellate, solitary in axils of reduced spaced upper leaves on stem and branch tips. Calyx broadly tubular, almost herbaceous, often colored, with prominent anastomosed veins, glabrous or with long crispate hairs, 10–13 mm long, bilobed, lobes recurrently crispate-lobed. Corolla pink, (18)20–22 mm long; tube erect, slightly shorter than galea; galea somewhat reclinate, slightly falcate at tip, subrostrate, with two obtuse teeth above throat and two minute, slender, erect teeth under tip; lip large, 3-lobed, slightly exceeding galea, ciliate. Filaments of two stamens pilose. Capsule 13–16 mm long, obliquely ovate, abruptly tapering into short, slightly recurved beak. Flowering from June to July. Fruiting from July to August.

In marshy meadows.—*Arctic Region*: Arctic Europe; *European USSR*: Karelia-Lapland, Dvina-Pechora, Baltic Region, Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Upper Dniester, Ural Mountains; *Caucasus*: Ciscaucasia (Kislovodsk). *General distribution*: Western Europe, North America (?). Described from northern Europe. Type in London.

*Note*. Splits into seasonal races which include *P. opsiantha* Ekm., growing along with typical *P. palustris*, but blossoming much later (see Pl. Finl. exs. No. 1335 and No. 1338).

- 776 84. *P. karoi* Freyn in Oesterr. Bot. Zeit. 46 (1896) 26 (germanic.).—*P. pseudo-karoi* Bonati in Bull. Acad. Géogr. XV (1905) 11.—*P. palustris* auct. fl. Sib. As. Med. and partim Ross. europ. orient.—*P. palustris* var. *wlassowiana* auct.—*Exs.*: Pl. Dahur. No. 386.

Biennial. Stem usually branched, with upright branches, glabrous or with long crispate hairs, 20–50 cm tall. Cauline leaves alternate, subsessile, long ciliate at base, gradually reduced upward, linear-lanceolate, pinnatisect; segments oblong-lanceolate or lanceolate, spaced, crenately lobed; lobes chondroid-dentate. Flowers short-pedicellate, solitary in axils of spaced reduced upper leaves toward stem and branch tips. Calyx broadly tubular, almost herbaceous, with prominent anastomosed veins, often densely long crispate-hairy, 6–7 mm long, bilobed, lobes crispate-lobed. Corolla pink, 14–16 mm long; tube erect, approximately equaling galea; galea slightly reclinate, scarcely falcate at tip, subrostrate, with two obtuse teeth above throat and two minute teeth under tip; lip 3-lobed, ciliate, equaling galea or slightly shorter. Filaments of stamens glabrous or two of them pilose. Capsule 7–10 mm long, obliquely ovate, abruptly narrowed into short, slightly recurved beak. Flowering from June to July. Fruiting from July to August.

In damp and marshy meadows.—*European USSR*: Trans-Volga Region, Lower Don, Ural Mountains; *Western Siberia*: Ob' Region, Upper Tobol, Irtysh, Altai; *Eastern Siberia*: Yenisey, Lena-Kolyma, Angara-Sayan, Dauria. *General distribution*: Mongolia. Described from vicinity of Nerchinsk. Isotype in Leningrad.

85. *P. vlassoviana* Stev. in Mém. Soc. Nat. Mosc. VI (1823) 27. tab. 9, f. 1.— *Ic.*: Stev. l.c.

Biennial. Stem branched, with upright branches, glabrous, 20–40 cm tall. Cauline leaves alternate, glabrous, subsessile, linear-lanceolate, pinnatisect; segments lanceolate, spaced, obtuse, crenate-lobed, chondroid-margined. Flowers short-pedicellate, solitary in axils of upper reduced, spaced leaves toward stem and branch tips. Calyx broadly tubular, slightly inflated, almost herbaceous, with prominent, loosely anastomosed veins, glabrous, 6 mm long, bilobed, lobes crispate-lobed. Corolla apparently pink, 10–11 mm long; tube erect, approximately equaling galea; galea slightly reclinate, suberect, almost beakless, with two obtuse teeth above throat, without teeth under tip; lip 3-lobed, glabrous along margin, much shorter than galea. Filaments of stamens glabrous. Capsule 9 mm long, obliquely broadly ovate, abruptly narrowed into short, erect beak. Flowering, fruiting (?).

- 777 Apparently in damp places.—*Eastern Siberia*: Dauria. Endemic. Described from Doroninsk. Isotype in Leningrad.

86. *P. hyperborea* Vved. sp. nov. in Addenda XXI, 817.—*P. parviflora* (non Smith) Kryl. Fl. Zap. Sib. X (1939) 2509 (excl. syn. and area geogr.).

Annual. Plant glabrous throughout. Stems single or few, often branched from middle, 5–10 cm tall. Radical leaves in rosette reduced, obovate, sessile, entire; cauline leaves few, distinctly alternate, but usually in close pairs, subsessile, lanceolate, deeply pinnatifid; segments linear-oblong, coarsely crenate, almost lobed; lowermost leaves sometimes obovate, deeply lobed; floral leaves crowded, slightly enlarged, deltoid, otherwise similar. Flowers subsessile or sessile, solitary in axils of floral leaves. Calyx almost membranous, with branched veins, 6–7 mm long, bilobed almost up to half, slightly deeper cleft at back; teeth almost flabellately lobed, lobes unequal, dentate at tip. Corolla apparently pink, with darker galea and spots on lip, 11–12 mm long; tube erect, or later smoothly weakly curved; galea erect, straight-truncate in front, slightly shorter than tube, with two deltoid, recurved teeth under throat, sometimes with two very minute, erect teeth under tip; lip 3-lobed, glabrous along margin, broader than long, slightly shorter than galea. Stamens with glabrous filaments. Capsule 6–8 mm long, obliquely broadly ovate, abruptly narrowed into beak. Flowering in July. Fruiting in August.

In mossy and dry tundra.—*Arctic Region*: Arctic Siberia (Ob' Region). Endemic. Described from eastern bank of Bay of Tazovsk. Type in Leningrad.

87. *P. pennellii* Hulten, Fl. Aleut. ils. (1937) 300, tab. 14.—*P. palustris* (non L.) Cham. and Schlecht. in Linnaea, II (1827) 582 and auct. fl. arctic. As. orient. and Amer. occid.—*lc.*: Hulten, *l.c.*

Annual. Plant glabrous throughout. Stem simple or branched from base or middle, with diverging branches, (2)5–10(15) cm tall. Radical leaves in rosette reduced, obovate, sessile, entire; cauline leaves few, distinctly alternate but in close pairs, subsessile, oblong-lanceolate, deeply pinnatifid; segments linear-oblong, chondroid-pointed, coarsely dentate; lowermost leaves usually obversely oblong, ovate, incise-lobed; floral leaves crowded, somewhat enlarged, deltoid, otherwise similar. Flowers subsessile or sessile, solitary in axils of floral leaves. Calyx almost membranous, with branched veins, 6–7 mm long, bilobed almost up to half, slightly deeply cleft at back, teeth almost flabellately lobed; lobes of teeth unequal, usually dentate at tip. Corolla apparently pink, with darker galea and spots on lip, 13–15 mm long; tube erect or scarcely curved; galea with indistinct beak, equaling tube or slightly shorter, with two deltoid, recurved teeth above throat, besides, usually with two minute filiform teeth above tip; lip 3-lobed, ciliate, broader than long, equaling galea. Filaments of two



stamens pilose. Capsule 8–10 mm long, obliquely ovate, rather abruptly narrowed into beak. Flowering in July. Fruiting in August.

In mossy and grassy tundra.—*Arctic Region*: Arctic Siberia (in west up to Gyda River), Chukotka, Anadyr; *Soviet Far East*: Okhotsk (?). *General distribution*: Alaska. Described from western Alaska (King Cove).

Section 5. *Anodon* Bge. in Ldb. Fl. Ross. III (1847–1849) 268.—Leaves alternate. Galea without beak and without teeth above throat.

Series 1. *Lanatae* Vved.—Root vertical, stout, neck densely covered with remnants of broadened rigid bases of leaf petioles. Leaves doubly pinnatisect. Corolla tube erect.

88. *P. willdenovii* Vved. nom. nov.—*P. langsdorffii* var.  $\beta$  Stev. in Mém. Soc. Nat. Mosc. VI (1823) 49. p.p. quoad plantas americanas.—*P. lanata* Willd. ex. Cham. and Schlecht. in Linnaea, II (1827) 583 (p.p.) and 584, non Pall. ex Stev. (1823); Bge. in Ldb. Fl. Ross. III, 299, p.p.—*P. lanata* var. *leiantha* Trautv. in Tr. Peterb. bot. sada 1 (1871) 76 in obs. p.p.—*P. lanata* auct. fl. amer.

Perennial. Root vertical, stout, with comparatively slender branches, often multiheaded, root neck densely covered with brown remnants of dead leaves. Stem simple, erect, arachnoid-hairy or arachnoid-villous, 2–10 cm tall. Radical leaves numerous; long-petiolate, base sheathing, villous inside, axis narrowly linear, somewhat arachnoid-hairy; lamina doubly pinnatisect, linear-lanceolate; primary segments spaced, secondary sparsely sharply toothed; lower cauline leaves similar to radical, upper less dissected, with broad axis, gradually transforming into bracts. Flowers in dense, capitate or often elongated (up to 20 cm in fruit), spicate, arachnoid-villous inflorescence. Lowermost bracts similar to upper cauline  
781 leaves, longer than flowers, middle linear, dentate at tip, arachnoid-villous, much shorter than flowers. Calyx campanulate, almost arachnoid-villous, 6–7 mm long; teeth deltoid, subacute, entire,  $2/5$ – $1/2$  as long as tube. Corolla pinkish purple, glabrous, only with hairy lines usually along throat and inside lip at base, very rarely with isolated hairs on galea, 18–21 mm long; tube erect or scarcely curved, broadened in throat; galea erect, without teeth, concave in front,  $2/3$  as long as tube; lip broad, 3-lobed, glabrous along margin, approximately equaling galea. Filaments of two stamens pilose-villous. Capsule 8–11 mm long, obliquely ovate, with beak tapering laterally. Flowering from June to July. Fruiting from July to August.

In lichen, stony tundra.—*Arctic Region*: Chukotka, Anadyr. *General distribution*: Arctic America, Greenland. Described from islands and coastal regions of Bering Sea. Type in Leningrad.

89. *P. pallasii* Vved. n. nov.; in Addenda XXI, 817.—*P. lanata* Pall. ex. Stev. in Mém. Soc. Nat. Mosc. VI (1823) 49 in syn. and



herb.—*P. langsdorffii* var.  $\beta$  Stev. l.c. p.p. quoad plant. kamtschat.—*P. lanata* var. *leiantha* Trautv. in A. H. P. 1 (1871) 76, in obs. p.p.—*P. lanata* auct. fl. kamtschat.

Perennial. Root straight, vertical, hard, branched, often multiheaded; neck densely covered with brown remnants of dead leaves. Stem simple, erect, thickset, densely leafy, somewhat arachnoid-hairy or arachnoid-villous, 2–7 cm tall. Radical leaves numerous, petiolate, base sheathing, villous inside, axis narrowly linear, somewhat arachnoid-hairy; lamina doubly pinnatisect, linear-lanceolate; primary segments somewhat spaced, secondary sharply toothed; cauline leaves similar, with broadly linear axis, gradually transforming into bracts. Flowers in dense capitate or elongated (up to 10 cm in fruit), arachnoid-villous, spicate inflorescence. Bracts arachnoid-villous, middle bracts linear, dentate at tip, shorter than flowers. Calyx campanulate, arachnoid-villous, 7 mm long; teeth narrowly deltoid, acute, entire or subdentate,  $1/2$  as long as tube. Corolla pinkish purple, sparsely pilose along galea, 18–22 mm long; tube erect, broadened in throat; galea erect, without teeth, concave in front,  $2/3$  as long as tube; lip broad, 3-lobed, ciliate, approximately equaling galea. Filaments of two stamens pilose-villous. Capsule 9–12 mm long, obliquely ovate, with beak tapering laterally. Flowering from June to July. Fruiting from July to August (Plate XXXV, fig. 3).

782 In stony tundra and in alpine zone among stones.—*Soviet Far East*: Kamchatka, Okhotsk (northern part), Sakhalin (Kuril Islands). Endemic. Described from Kamchatka. Type in Leningrad.

90. *P. dasyantha* Hadac in Skrif. Svalb. Ish. 87 (1944) 57, f. 20b.—*P. langsdorffii* var. *gymnostemon* Trautv. Pl. imag. and descr. Fl. Russ. (1844) 59, tab. 38.—*P. lanata* var. *dasyantha* Trautv. in Tr. Peterb. bot. sada 1 (1871) 76.—*P. lanata* auct. fl. arct. europ. and part. asiat.—*l.c.*: Trautv. l.c. (1844).

Perennial. Root vertical, stout, with comparatively slender branches, sometimes multiheaded, neck covered with brown remnants of dead leaves. Stem simple, erect, thickset, arachnoid-villous, 2–7 cm tall. Radical leaves numerous, petiolate, subglabrous, base sheathing, arachnoid-villous inside; axis narrowly linear; lamina doubly pinnatisect, linear-lanceolate; primary segments spaced, secondary sparsely crenate; cauline leaves less dissected, with broad axis, more densely pubescent, gradually transforming into

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Plate XXXIX.

1. *Pedicularis chamissonis* Stev., general appearance of plant, flower, part of leaf.—2. *P. alberti* Rgl., general appearance of plant, flower, part of leaf.—3. *P. rubens* Steph., general appearance of plant, flower, leaf.



bracts. Flowers in dense capitate or elongated inflorescence, sometimes somewhat lax (up to 10 cm in fruit) arachnoid-villous, spicate. Lowermost bracts similar to upper cauline leaves, middle linear, arachnoid-villous, lobed at tip, subglabrous, slightly shorter than or equaling flowers. Calyx campanulate, arachnoid-villous, 7–9 mm long; teeth narrowly deltoid, acute, entire,  $1/2$  as long as tube. Corolla pinkish purple, 17–20 mm long, with erect tube; galea almost villous, erect, obscurely bidentate, almost equaling tube; lip 3-lobed, ciliate, slightly shorter than galea. Filaments of stamens glabrous or with isolated hairs. Capsule 10–15 mm long, obliquely ovate, with short beak tapering laterally. Flowering from June to August. Fruiting from July to September.

In lichenaceous-stony tundra.—*Arctic Region*: Arctic Europe, Novaya Zemlya, Arctic Siberia (western part). *General distribution*: Spitzbergen. Described from Spitzbergen.

91. *P. adamsii* Hulten in Kungl. Sven. Vetén. Hand. 8, 2 (1930) 117 in adn.—*P. langsdorffii* var.  $\beta$ . Stev. in Mém. Soc. Nat. Mosc. VI (1823) 49, p.p. quoad plant. Adams.—*P. alopecuroides* Adams ex Stev. l.c. in syn. and herb.—*P. alopecuroides* Stev. ex Spr. Syst. II (1825) 780.—*P. lanata* var. *alopecuroides* Trautv. in Tr. Peterb. bot. sada 5 (1877) 93; Maxim. in Mém. biol. XII, 916, f. 176.—*P. lanata* auct. fl. asiat. p.p.—*lc.*: Hult. l.c. tab. 5, f.c.

783 Perennial. Root vertical, branched, stout, sometimes multiheaded; neck densely covered with brown remnants of dead leaves. Stem simple, erect, thickset, somewhat arachnoid-villous, 2–10 cm tall. Radical leaves numerous, petiolate, somewhat arachnoid-villous, base sheathing, arachnoid-villous inside, axis narrowly linear; lamina doubly pinnatisect, lanceolate; primary segments, spaced, secondary sparsely sharply toothed; cauline leaves short-petiolate, with broadly linear axis, pinnatisect, with deeply lobed segments, otherwise similar, gradually transforming into bracts. Flowers in compact, capitate or often elongated (up to 20 cm in fruit), villous, spicate inflorescence. Lowermost bracts leaflike, middle linear, arachnoid-villous, pinnately lobed at tip, much shorter than flowers. Calyx campanulate, arachnoid-villous, 9–11 mm long; teeth deltoid, acute, obscurely dentate,  $1/2$  as long as tube. Corolla pinkish purple, (26)30–35 mm long, with erect tube; galea villous, scarcely or rather intensely falcate, approximately equaling tube, with two small, acute, erect teeth under tip; lip broad, 3-lobed, shortly clawed, ciliate, slightly shorter than galea. Filaments of two stamens villous-pilose. Capsule 15–20 mm long, obliquely ovate, with beak tapering laterally. Flowering from June to August. Fruiting from July to August.

In lichenaceous-stony tundra and in similar mountainous regions of tundra.—*Arctic Region*: Arctic Siberia, Chukotka; *Eastern Siberia*:

Lena-Kolyma. Described from lower reaches of Lena River. Isotype in Leningrad.

*Note.* A sheet with two specimens certainly of this species preserved in the herbarium of the Botanical Institute of Akad. Nauk SSSR, is identified as *P. lanata* W., with the label: "1844. in humid. summas alp. Alatau. 4.S.," without mentioning collector's name. O. and B. Fedchenko (Consp. fl. turk. V, 110) ascribe these collections to Karelin and Kirilov. However, according to Lipsky, these authors did not collect specimens in Dzhungar Ala-Tau in 1844. The correctness of these indications, therefore, is doubtful; in any case, the occurrence of *P. adamsii* even in the northern mountains of Central Asia needs solid proof.

Series 2. *Hirsutae* Vved.—Root vertical, branched; neck covered with broken remnants of radical leaves. Leaves pinnatisect, especially cauline leaves with broad axis. Corolla tube erect or scarcely curved.

92. *P. langsdorffii* Fisch. ex. Stev. in Mém. Soc. Nat. Mosc. VI (1823) 49, tab. 9, 2 (excl. var.  $\beta$ .); Bge. in Ldb. Fl. Ross. III, 288; Maxim. in Mém. biol. XII, 916, fig. 174.—*P. arctica* R. Br. in Suppl. app. Parry voy. (1824) 280, non M.B. ex Stev. (1823) nec Adams ex Stev. (1823).—*P. purpurascens* Cham. ex Spr. Syst. II (1825) 781.—*P. hians* Eastw. in Coult. Bot. Gaz. XXXIII (1902) 289.

784 Perennial. Root vertical, slender, branched, sometimes multiheaded; neck often covered with brown broken remnants of radical leaves. Stem simple, erect, with scattered long crispate hairs, subglabrous, (3)5–10 cm tall. Radical leaves petiolate, glabrous, sometimes long crispate-hairy along petioles; lamina linear-lanceolate, almost pinnatisect; segments somewhat spaced, oblong, pinnately obtuse-lobed; cauline leaves short-petiolate, long crispate-hairy at base, with very broad axis, with dentate spaced segments, gradually transforming into bracts. Flowers short-pedicellate, in capitate inflorescence, often interrupted in lower part, rarely somewhat lax, elongated, somewhat villous, spicate. Lowermost bracts leaflike, middle linear, long crispate-hairy at base, deeply pinnately lobed, with sparsely dentate lobes, equaling or slightly shorter than flowers. Calyx campanulate, long crispate-hairy, sometimes almost villous, 8–14 mm long; teeth deltoid, acute, sometimes broadly spatulate at tip, dentate, at least 1/2 as long as tube. Corolla reddish purple, bright, glabrous, 24–28 mm long; tube erect or slightly curved; galea slightly falcate, with two teeth under tip, equaling tube or slightly longer; lip 3-lobed, serrate along margin, glabrous or sparsely ciliate, slightly shorter than galea. Filaments of two stamens pilose. Capsule obliquely oblong-lanceolate, soft-walled, very acute, 10–12 mm long. Flowering from July to August. Fruiting in August.

In mossy tundra.—*Arctic Region*: Chukotka, Anadyr; *Soviet Far East*: Kamchatka. *General distribution*: Beringia, Arctic America. Described from Aleutian Islands.

93. *P. hirsuta* L. Sp. pl. (1753) 609; Bge. in Ldb. Fl. Ross. III, 299; Kryl. Fl. Zap. Sib. X, 2523.—*P. arctica* Adams ex Stev. in Mém. Soc. Nat. Mosc. VI (1823) 51 in obs. and herb.—*Exs.*: Herb. norm. No. 4922.

Perennial. Root vertical, branched, sometimes multiheaded; neck covered with brown broken remnants of radical leaves. Stem simple, erect, somewhat arachnoid-hairy, arachnoid-villous under inflorescence, 2–10 cm tall. Radical leaves long-petiolate; with isolated crispate hairs or glabrous, axis narrowly linear; lamina lanceolate, pinnatisect; segments spaced, oblong, pinnately lobed; cauline leaves short-petiolate, with very broad axis, more densely pubescent, with reduced, dentate, spaced segments, gradually transforming into bracts. Flowers short-pedicellate in compact, capitate, sometimes few-flowered, or sometimes elongated many-flowered, 785 arachnoid-villous, spicate inflorescence. Lowermost bracts leaflike, middle arachnoid-villous, linear, dentate at tip, shorter than flowers. Calyx campanulate, arachnoid-villous, 6–9 mm long; teeth deltoid, somewhat dentate, acute, 1/2 as long as tube. Corolla dull pink, glabrous, 12–16 mm long; tube erect or usually scarcely curved near calyx throat; galea erect or scarcely curved, often equaling tube or slightly shorter, with two very minute, indistinct teeth under tip; lip small, glabrous along margin, serrate, 3-lobed, slightly shorter than galea. Stamens with glabrous filaments. Capsule obliquely oblong-lanceolate, soft-walled, very acute, 10–13 mm long. Flowering from July to August. Fruiting in August (Plate XXXV, fig. 1).

In marshy, less often dry tundra.—*Arctic Region*: Arctic Europe, Arctic Siberia. *General distribution*: Northern Scandinavia, Spitzbergen, Greenland, Arctic America (eastern part). Described from Lapland. Type in London.

Series 3. *Flammeae* Vved.—Root reduced, with vertically thickened fibers. Leaves pinnatipartite, lobes reclinate, usually imbricate. Corolla tube erect.

94. *P. oederi* Vahl in Hornem. Fors. Dansk. Oeconom. Pl. 2, ed. I (1806) 580; Kryl. Fl. Zap. Sib. X, 2524.—*P. versicolor* Wahlenb. Veg. Helvet. (1813) 118; Ldb. Fl. Ross. III, 300; Maxim. in Mém. biol. 12, 918, f. 177.— *Ic.*: Rchb. Ic. fl. Germ. tab. 1759, f. 6–16.—*Exs.*: Fl. Stir. exs. No. 296; Fl. exs. austro-hung. No. 2119; Pl. pol. exs. No. 257.

Perennial. Root short, with fusiform fibers. Stems 1–3, simple, erect or ascending at base, glabrous in lower part, long crispate-hairy above, paleaceous at base, 3–15 cm tall. Radical leaves linear, pinnatipartite, glabrous above or long crispate-hairy on both surfaces; lobes crowded, reclinate,



often imbricate or sometimes separate, oblong or subovate, 1-2-crenate, recurved along margin; cauline leaves alternate, lower with crispate-hairy petioles, 1/2 as long as lamina or shorter; upper leaves sessile. Inflorescence dense, with spaced lowermost flowers, 2-8 cm long. Bracts almost equaling calyx, densely crispate-hairy, lanceolate, slightly broadened at tip, chondroid-dentate; upper bracts sublinear. Calyx 8-13 mm long, on to 5 mm long pedicel, tubular-campanulate, with 10 villous veins; teeth 5, unequal, subacute, deltoid-lanceolate, entire or spatulately broadened, dentate, 2/5-1/2 as long as tube. Corolla 18-24 mm long, yellowish, 786 glabrous, with erect tube; galea projecting forward, rounded above, concave in front, truncate at tip, dorsally slightly concave or straight, narrowed above middle, usually reddish at tip, 1.5 times as long as lip; lip reniform, 10 × 12 mm, 3-lobed, middle lobe ovate, obtuse, 2.5-3 × 3-4.5 mm, constricted at base. Filaments of two stamens pilose. Capsule obliquely oblong-lanceolate, 15-20 mm long. Flowering from June to July. Fruiting from July to August.

In tundra and on stony slopes in high-mountain zone.—*Arctic Region*: Arctic Europe, Novaya Zemlya, Arctic Siberia, Chukotka, Anadyr; *European USSR*: Upper Dniester, Urals; *Western Siberia*: Altai; *Eastern Siberia*: Angara-Sayan, Lena-Kolyma, Dauria; *Soviet Far East*: Kamchatka, Okhotsk, Sakhalin (Kurils); *Soviet Central Asia*: Dzh.-Tartagatai, Tien Shan, Pamiro-Alai, *General distribution*: Arctic of Old and New World, Western Europe, Dzh.-Kashgar, Mongolia, Tibet, India-Himalayas. Described from Norway (Dovrefjell).

*Note*. A polymorphic species, deserving critical study. *Var. rubra* Maxim. l.c. (= *P. lanata* var. *beketowii* Krassn. Spisok (1887) 90; *P. gobii* Krassn. im Herb.) from Khantengr deserves special attention.

*Series 4. Albertianae* Vved.—Root fascicular, with fusiform thickened fibers. Leaves pinnatisect. inflorescence basipetal. Corolla tube curved.

95. *P. alberti* Rgl. in Tr. Peterb. bot. sada 6 (1880) 353; Maxim. in Mél. biol. XII, 916, f. 175.—*l.c.*: Maxim l.c.

Perennial. Root fascicular, with fusiform thickened fibers. Stems 1-2, erect or slightly flexuous, simple, thickset, slightly shining, crispate arachnoid-pubescent, equaling or 1.5 times as long as radical leaves, paleaceous, at base, (5)10-20 cm tall. Radical leaves lanceolate, with isolated crispate hairs along veins, with crispate-ciliate petioles, 1/2 as long as lamina; lamina pinnatisect; segments oblong-lanceolate, often tapering above, slightly decurrent on winged axis, chondroid-pointed, imbricate-lobed, sometimes with overlapping margins; lobes of segments chondroid-pointed, chondroid-denticulate; cauline leaves intensely reduced, alternate, 1-3, sessile or subsessile, uppermost leaves less dissected. Inflorescence elongated, 4-10 cm long, dense, lowermost flowers slightly distant.

Lowermost bracts similar to upper leaves, middle oblong-lanceolate, entire, long acuminate, chondroid-dentate at tip, long crispate-ciliate, uppermost bracts linear, entire. Calyx sessile, campanulate, 5–6 × 10 mm, 787 10 × 11 mm in fruit, membranous, with 10 villous veins, with reticulum in between, 1/3 cleft into 5 deltoid-lanceolate, acute, entire teeth, upper tooth shorter. Corolla apparently dull pinkish purple, 15–17 mm long; tube curved near calyx throat; galea erect, without beak and teeth, dorsally slightly concave, slightly convex in front, 2 times as long as lip; lip 3-lobed, small (5 × 5 mm), glabrous, with abruptly short-pointed lobes. Filaments of stamens glabrous or with isolated short hairs. Capsule obliquely ovate, 12 mm long, with hooked beak. Flowering from April to June. Fruiting from May to July (Plate XXXIX, fig. 2).

In fir and deciduous forests.—*Soviet Central Asia*: Tien Shan (Trans-Ili Ala-Tau). *General distribution*: Kuldzha. Described from vicinity of Alma-Ata. Type in Leningrad.

Series 5. *Foliosae* Vved.—Root thickened, branched. Leaves pinnatisect, segments sharply incise-lobed. Corolla tube curved.

96. *P. exaltata* Bess. ex. Bge. in Ldb. Fl. Ross. III (1847–1849) 296; Schmalh. Fl. II, 288.—*P. sumana* var. *exaltata* Limpr. in Fedde, Repert. sp. nov. XX (1924) 201.—*P. hacquetii* ssp. *exaltata* Klaster. in Bull. intern. Ces. Akad. XXIX (1928) 215. —*P. foliosa* auct. fl. Ukrain. and Beloruss.— *Ic.*: Rchb. Ic. fl. Germ. f. 1774.—*Exs.*: Fl. Germ. exs. No. 2549.

Perennial. Root thickened, branched, with comparatively slender branches. Stem simple, erect, very stout, fistular, ribbed, often longitudinally twisted, puberulent above in patches, 100–200 cm tall. Radical leaves large, long-petiolate, glabrous, pinnatisect; segments spaced, lanceolate, acuminate, pinnatipartite; lobes of segments chondroid-pointed, decurrent, regularly chondroid-serrate; cauline leaves reduced upward, gradually transforming into bracts, short-petiolate, or upper leaves sessile. Flowers in dense, elongated, many-flowered, spicate inflorescence, sometimes interrupted in lower part. Bracts glabrous, lowermost leaflike, middle lanceolate, pinnatipartite, with chondroid-serrate lobes, longer than flowers. Calyx campanulate, undivided, coriaceous, glabrous, villous-ciliate only along margin, about 10 mm long; teeth deltoid, obscure, short. Corolla yellowish, about 25 mm long, sparsely pubescent along galea, with slightly curved tube; galea erect, concave in front, without teeth, 1/2 as long as tube; lip 3-lobed, slightly shorter than galea. Filaments of two stamens villous-pilose. Flowering from June to July.

In marshy meadows.—*European USSR*: Upper Dnieper (Belovezhskaya Pushcha). Middle Dnieper (Kremenets, Blistova). *General distribution*: Central Europe. Described from vicinity of Kremenets (?).

788 97. *P. hacquetii* Graf in Flora, 17 (1834) 42; Klaster in Bull. intern. Ces. Akad. XXIX (1928) 210.—*P. transsilvanica* Schkur in Oesterr. Bot. Zeit. XI (1861) 361.—*P. carpatica* Porc. Enum. (1878) 44.—*P. foliosa* auct. fl. carpat.— *Ic.*: Rchb. Ic. fl. Germ. f. 1775.— *Exs.*: Fl. exs. austrohung. No. 2117 (sub *P. sumana*).

Perennial. Root thickened, branched, branches thickened. Stem simple, erect, stout, fistular, ribbed, often longitudinally twisted, leafy mainly in upper part, crispate-pubescent, 20–80 cm tall. Radical leaves large, long-petiolate, glabrous above, somewhat crispate-pubescent beneath along axis and petiole; lamina oblong-ovate, pinnatisect; segments lanceolate, acute, spaced, pinnatipartite; lobes of segments acute, chondroid-pointed, unequally chondroid-dentate; cauline leaves reduced upward, gradually transforming into bracts, short-petiolate or sessile, less dissected. Flowers in dense, many-flowered, cylindrical, spicate inflorescence, sometimes interrupted at base. Bracts villous at base, lowermost leaflike, middle linear-lanceolate, coarsely sharply serrate, slightly longer than flowers. Calyx campanulate, slightly inflated, 1/3–1/2 cleft in front, coriaceous, somewhat crispate-hairy or almost villous, 8–10 mm long; teeth unequal, deltoid, entire, several times shorter than tube, or almost indistinct. Corolla yellowish, 20–25 mm long, somewhat pubescent along tube and galea; tube slightly curved, usually pubescent inside; galea erect, concave in front, without teeth, 1/2 as long as tube; lip 3-lobed, approximately equaling galea. Stamens with pilose-villous or subglabrous filaments. Capsule ovate, acute, with hard valves, 10–12 mm long. Flowering from June to July. Fruiting from July to August.

In alpine and subalpine meadows, at 1300–1850 m.—*European USSR*: Upper Dniester. *General distribution*: Central Europe. Described from Upper Kraina.

98. *P. condensata* M.B. Fl. taur.-cauc. II (1808) 72; Bge. in Ldb. Fl. Ross. III, 297; Boiss, Fl. or. IV, 487; Maxim. in Mém. biol. XII, 915, f. 172; Grossh. Fl. Kavk. III, 403.—*P. campylisipho* C. Koch in Linnaea, XXII (1849) 682 (sec. Boiss. l.c.).—*P. tatianae* Bordz. in Fedde, Repert. sp. nov. XXXVI (1934) 305.— *Ic.*: Mém. Soc. Nat. Mosc. VI, tab. 17.— *Exs.*: Herb. Fl. Cauc. No. 192; Pl. or. exs. No. 170.

789 Perennial. Root thickened, branched. Stem simple, erect, or slightly bent, rather stout, ribbed, long crispate-hairy, villous under inflorescence, (5)10–30(60) cm tall. Radical leaves with long, long crispate-hairy petioles up to 2 times as long as lamina, long crispate-hairy along axis and beneath, especially along veins; lamina oblong, pinnatisect; segments deltoid-lanceolate, spaced, deeply pinnatipartite; lobes of segments very sharp, chondroid-tipped, sharply unequally chondroid-serrate or lobed; cauline leaves crowded mainly in upper part of stem, deltoid-oblong,



with narrowly winged axis, shorter petioles, upper leaves subsessile, otherwise similar. Flowers in compact, usually elongated, spicate, villous inflorescence. Lowermost bracts leaflike, middle shorter than flowers, lanceolate, pinnatifid, with acute, chondroid-serrate lobes. Calyx tubular-campanulate, somewhat inflated, villous, cleft in front, 10–13 mm long; teeth herbaceous, unequal, deltoid, pointed, entire or rarely 1–2-dentate,  $1/3$  as long as tube. Corolla yellowish, 23–28 mm long; tube falcate, pilose-villous inside and sometimes also outside, broadened in throat; galea erect, concave in front, without teeth, beakless or with scarcely discernible beak,  $1/2$  as long as tube; lip 3-lobed, shortly clawed, slightly shorter than galea. Filaments of stamens villous-pilose or two of them, or sometimes all, glabrous. Capsule subovate, subsymmetrical, about 10 mm long. Flowering from June to August. Fruiting from July to August.

In subalpine and alpine meadows.—*Caucasus*: Ciscaucasia, Dagestan, western, eastern and southern Transcaucasia. *General distribution*: Balkan States-Asia Minor. Described from eastern Caucasus and western Iberia. Type in Leningrad.

*Note.* *P. sajanensis* Steph. ex Bge. [in Ldb. Fl. Ross. 3 (1847–1849) 298 in obs.] probably should be included as a synonym of *P. condensata*, M.B. and hardly originates ex. alp. “Sajanensibus”, as stated on the label in Stephan’s Herbarium. A more distinct rudimentary beak on the galea, as depicted by Maximowicz (op. cit. tab. 171), the feature by which he distinguishes *P. sajanensis* from *P. condensata* in the key, does not fall outside the range of variation of Caucasian plants, as can be observed in the extensive material now available. The less curved corolla tube in Maximowicz’s diagram does not explain the real situation, but the pubescence inside the tube can be noted even in the diagnosis of Maximowicz himself. Apparently, we have here a mix-up of labels which occurred long ago. Moreover, nothing similar to *P. sajanensis* or any other species of the group *Foliosae* has been collected to date either in the Sayans, or generally in Siberia.

99. *P. atripurpurea* Nordm. in Bull. Acad. Sc. Pétersb. II (1837) 313; Bge. in Ldb. Fl. Ross. III, 298; Boiss. Fl. or. IV, 487; Maxim. in Mém. biol. XII, 915, f. 170; Grossh. Fl. Kavk. III, 404.—*P. doelingiana* Nordm. ex Bge. in Bull. Acad. Sc. Pétersb. VIII (1841) 252 (nomen nudum) and herb.—*P. villobractea* C. Koch in Linnaea, XXII (1849) 790 682 (sec. Boiss. l.c.).—*l.c.*: Maxim. l.c.—*Exs.*: GRF, No. 682.

Perennial. Root thickened, branched, with comparatively slender lateral branches. Stem simple, erect, stout, glabrous, crispate-hairy only in upper part, ribbed, 30–70 cm tall. Radical leaves (usually absent) long-petiolate; petioles glabrous, exceeding lamina; lamina oblong, crispate-hairy beneath, pinnatisect; segments lanceolate, deeply pinnatifid, decurrent, sublinear, sharply chondroid-lobed, lobes sharply

chondroid-serrate; cauline leaves on upper part of stem, deltoid-ovate, sessile, with pubescent axis, otherwise similar. Flowers in compact, elongated, villous, spicate inflorescence. Bracts (lowermost leaflike) villous along margin, slightly exceeding flowers, linear; lower bracts dentate at tip, upper subentire. Calyx campanulate, slightly inflated, villous, not cleft in front, 9–10 mm long; teeth herbaceous, unequal, deltoid, entire, sharply tapering,  $1/2$  as long as tube. Corolla dark purple, glabrous, 18–20 mm long; tube scarcely falcate, broadened at throat; galea slightly reclinate, concave in front, with erect teeth under tip,  $1/2$  as long as tube; lip 3-lobed, rather long clawed, equaling galea. Filaments of stamens villous-pilose, two of them more densely. Capsule ovate, symmetrical, about 10 mm long. Flowering from June to August. Fruiting from July to August (Plate XXXVIII, fig. 2).

In subalpine meadows.—*Caucasus*: Ciscaucasia, western Transcaucasia, eastern Transcaucasia (western part), southern Transcaucasia (?). *General distribution*: Balkan States-Asia Minor. Described from Adzharia and Akhaltsikh. Type in Leningrad.

100. *P. panjutinii* E. Busch in Botan. Zhurn. SSSR 20 (1935) 353 cum icon.—*lc.*: E. Bush, l.c.

Perennial. Root thickened, branched, Stem simple, erect, rarely slightly flexuous, sometimes ascending at base, rather stout, glabrous, villous above and under inflorescence, ribbed, 10–25 cm tall. Radical leaves few if present, long-petiolate, with isolated crispate hairs, oblong, pinnatisect; segments narrowly lanceolate, slightly spaced, acute, sharply deeply serrate-lobed or parted, lobes sometimes serrate; cauline leaves few, abruptly reduced upward, short-petiolate or upper leaves sessile, otherwise similar. Flowers in dense, villous, many-flowered, spicate inflorescence. Bracts villous at base, lowermost sometimes almost leaflike, middle sublinear, cristate-dentate at tip, shorter than flowers. Calyx campanulate, villous, slightly cleft in front, 6–8 mm long; teeth broadly deltoid,  $1/3$  as long as tube. Corolla pinkish purple, 18–22 mm long; tube slightly curved, sparsely villous inside and outside; galea erect, without teeth,  $1/2$  as long as tube; lip 3-lobed, shortly clawed, slightly villous outside at base, equaling galea. Stamens with villous-pilose filaments. Capsule about 1 cm long. Flowering from July to September.

In alpine, sometimes stony meadows.—*Caucasus*: Ciscaucasia, western Transcaucasia (in upper reaches of Bzyb and Teberda rivers). Endemic. Described from specimens from several places. Panyutin's specimens are from Yapskh Pass. Type in Leningrad.

101. *P. balkharica* E. Busch in Tr. Bot. muzeya Akad. Nauk SSSR 19 (1926) 184 cum icon.; Grossh. Fl. Kavk. III, 404.—*lc.*: E. Bush, l.c.

Perennial. Root thickened, branched. Stem simple, erect or flexuous, almost arachnoid-villous, 5–10 cm tall. Radical leaves long-petiolate, almost arachnoid-villous beneath and especially on petioles; lamina lanceolate, pinnatisect; segments crowded, lanceolate, deeply pinnately lobed; lobes abruptly chondroid-pointed, sometimes serrate; cauline leaves 1–2, short-petiolate or subsessile, somewhat reduced, otherwise similar. Flowers in dense, spicate, almost arachnoid-villous inflorescence, interrupted in lower part; lowermost flowers with up to 1 cm long pedicels. Bracts often colored, lowermost leaflike, longer than flowers; middle bracts linear-lanceolate, pinnatipartite, approximately equaling flowers, almost arachnoid-villous at base and beneath. Calyx campanulate, 12–15 mm long, almost arachnoid-villous, not cleft in front; teeth spatulate, herbaceous, acute, sharply dentate (posterior slightly reduced), scarcely shorter than tube. Corolla dull pink, 20–22 mm long, glabrous; tube curved in calyx throat; galea erect, without teeth,  $2/3$  as long as tube; lip large, 3-lobed, very shortly clawed,  $2/3$  as long as galea. Stamens with villous-pilose filaments. Capsule obliquely ovate, 12–15 mm long. Flowering from June to July. Fruiting in August.

Among debris in alpine zone.—*Caucasus*: Ciscaucasia (Balkaria). Endemic. Described from Suukauz Pass. Type in Leningrad.

102. *P. wilhelmsiana* Fisch. ex M.B. Fl. taur.-cauc. III (1819) 412; Bge. in Ldb. Fl. Ross. III, 298; Boiss. Fl. or. IV, 487; Maxim. in Mém. biol. XII, 915; Grossh. Fl. Kavk. III, 404.—*Ik.*: Mém. Soc. Nat. Mosc. VI, tab. 16.—*Exs.*: Herb. Fl. Cauc. No. 193; Pl. or. exs. No. 197.

- 792 Perennial. Root thickened, branched. Stem simple, erect, stout, long crispate-hairy, sometimes almost villous, 7–25(40) cm tall. Radical leaves numerous, with long crispate-hairy petioles shorter than lamina, long crispate-hairy along axis and beneath, mainly along veins; lamina lanceolate, acuminate, pinnatisect; segments oblong, closer, sometimes imbricate, pinnatipartite; lobes chondroid-serrulate or sometimes lobed; cauline leaves usually absent or 1–2, in lower part of stem, similar to radical leaves, but with shorter petioles, or 1–2 under inflorescence, bractlike. Flowers in compact, capitate-spicate, villous inflorescence, sometimes elongated in fruit. Bracts much exceeding flowers, acuminate, villous at base, glabrous above, long crispate-hairy beneath; lower and middle bracts horizontally diverging or recurved, uppermost erect, forming tuft, lowermost linear-lanceolate, deeply pinnatipartite; lobes chondroid-serrulate and lobed, middle bracts sublinear, less dissected. Calyx campanulate, cleft in front, villous, 9–12 mm long; teeth herbaceous, spatulate, acute, sharply dentate (posterior slightly reduced, subdeltoid), equaling tube. Corolla pink, with lower lip yellowish (?) in throat, 18–20 mm long, glabrous; tube curved at right angle in calyx throat, dorsally slightly concave; galea



erect, without teeth, slightly shorter than tube; lip shortly clawed, 3-lobed, at least  $1/2$  as long as galea. Filaments of stamens pilose-villous, two of them sparsely so. Capsule obliquely oblong-ovate, 10–12 mm long. Flowering from May to June. Fruiting from June to July.

In subalpine and alpine meadows.—*Caucasus*: Ciscaucasia, western Transcaucasia (northern part), eastern and southern Transcaucasia. *General distribution*: Balkan States-Asia Minor. Described from Beshtau Mountain. Type in Leningrad.

Series 6. *Capitatae* Vved.—Rootstock slender, ascending. Leaves pinatisect. Lip parallel to galea; corolla tube erect.

103. *P. capitata* Adams in Mém. Soc. Nat. Mosc. V (1817) 100; Bge. in Ldb. Fl. Ross. III, 301; Maxim. in Mém. Biol. XII, 912, f. 163; Kryl. Fl. Zap. Sib. X, 2527.—*P. stelleriana* Pall. in herb.—*lc.*: Trautv. Imag. Fl. Ross. tab. 36; Maxim. l.c.

793 Perennial. Root fibers filiform. Rootstock slender, funiform, ascending. Stem erect, sparsely crispate-hairy, 5–15 cm tall. Radical leaves few, about  $1/2$  as long as stem, scattered crispate-pubescent, petiolate; lamina oblong-lanceolate or oblong, slightly shorter than petiole, pinna-tisect; segments oblong, pinnately lobed, crenate; cauline leaves usually absent or rarely 1(2). with shorter petioles, somewhat reduced. Bracts with short broadened petioles, lower leaflike, upper with reduced, less dissected lamina. Flowers in few-flowered capitate inflorescence. Calyx campanulate, crispate-hairy, 10–12 mm long; teeth herbaceous, subspatulate, dentate (posterior somewhat reduced, deltoid, entire),  $1/2$ – $2/3$  as long as tube. Corolla white or yellowish (?), often with pink lip and galea or pink throughout (?), 20–35 mm long; galea subfalcate, 2 times as long as erect tube, with very short, obtuse beak; lip 3-lobed, long and broad clawed, hairy inside at base,  $2/3$  as long as galea and parallel to it. Filaments of stamens pubescent at base. Capsule obliquely oblong, 10–15 mm long. Flowering from July to August. Fruiting in August.

In tundra and in alpine meadows.—*Arctic Region*: Arctic Siberia, Chukotka, Anadyr. *Eastern Siberia*: Lena-Kolyma (northern part); *Soviet Far East*: Kamchatka, Okhotsk. *General distribution*: North America. Described from mouth of Lena River. Type in Leningrad.

*Note*. Komarov writes [Fl. Kamch. 3 (1930) 86] “corolla . . . white or yellowish white . . . lip pinkish violet at tip” and further: “distinguished . . . by long white corolla.” It is often difficult to distinguish the color of the corolla in dried *Pedicularis*, therefore it is impossible to say what the color of the Kamchatka plant is according to the personal report of Gorodkov, who repeatedly collected this species from coastal regions of the Arctic Ocean, this species has whitish yellow flowers and never has any pink shade. On the contrary, Vasilev, who observed it several times along the

coast of the Sea of Okhotsk, asserts that the flowers are always pink. Judging from herbaria, the plant from the vicinity of Verkhoyansk also has pink flowers. Polunin [Bot. Canad. East. Arct. 1 (1940) 338] reports, citing also other researchers of the American Arctic, a pale yellow corolla with a purple galea tip.

Thus, additional special observations are needed for a final solution of the question of the synonymy of *P. capitata* Adams and *P. nelsonii* R. Br.

Section 6. *Sceptrum* Bge. in Ldb. Fl. Ross. III (1847–1849) 268.—Lip parallel to galea. Anthers obtuse. Capsule globose, symmetrical.

104. *P. sceptrum-carolinum* L. Sp. pl. (1753) 608; Kryl. Fl. Zap. 794 Sib. X, 2526.—*P. sceptrum* Bge. in Ldb. Fl. Ross. III, 302; Turcz. in Bull. Soc. Nat. Mosc. XXIV, 2, 350; Maxim. in Mém. biol. XII, 214.—*lc.*: Rchb. Ic. fl. Germ. tab. 1763.—*Exs.*: Pl. pol. exs. No. 258; Pl. Finl. exs. No. 1339; Fl. exs. austro-hung. No. 1399.

Perennial. Root fibers thin. Stem erect, glabrous or with scattered short hairs, leafless or moderately leafy, 30–70 cm tall. Radical leaves lanceolate or oblong-lanceolate, glabrous or with scattered short hairs, short-petiolate, deeply pinnatipartite; lobes broadly ovate, obtuse, crenately notched, lacinules chondroid-crenate; cauline leaves in lower part of stem, alternate, opposite or whorled, short-petiolate or sessile, less incised, otherwise similar; upper leaves (if present) bractlike. Inflorescence lax, spicate, with subsessile flowers, 7–20 cm long. Bracts ovate, slightly exceeding calyx, denticulate, sometimes subentire. Calyx 12–14 mm long, herbaceous with 10 fine veins, with 5 equal, deltoid-ovate, chondroid-dentate teeth, 1/3 as long as tube. Corolla 34–37 mm long, yellow, sometimes violet at tip of lower lip; galea smoothly moderately falcate, without teeth, villous-ciliate in front, scarcely exceeding lip; lip 3-lobed, entire, obovate. Filaments of stamens glabrous, subobtusate. Capsule about 15 mm long, globose, with tapering erect tip. Flowering from July to August. Fruiting in August.

In marshes and damp meadows.—*Arctic Region*: Arctic Europe, Arctic Siberia, *European USSR*: Karelia-Lapland, Dvina-Pechora, Baltic Region, Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Upper Dniester, Urals; *Western Siberia*: Ob' Region, Irtysh; *Eastern Siberia*: Lena-Kolyma, Angara-Sayan, Dauria; *Soviet Far East*: Okhotsk, Zeya-Bureya, Uda Region, Ussuri, Sakhalin. *General distribution*: Scandinavia, Central Europe, Mongolia, Japan-China. Described from Sweden, "Prussia" and Russia.

*Note*. A polymorphic species, the thorough study of which is hindered in the herbarium by the preservation of the corolla color. On detailed critical analysis, it splits into several species, one of which is also *P. pubescens* Pai [Contr. Inst. Bot. Acad. Peiping. 2 (1934) 125].

Section 7. *Diacmandra* Bge. in Ldb. Fl. Ross. III (1847-1849) 268.—Lip parallel to galea. Anthers spurred at base. Capsule compressed, subsymmetrical.

105. *P. grandiflora* Fisch. in Mém. Soc. Nat. Mosc. III (1812) 60; Bge. in Ldb. Fl. Ross. III, 303; Turcz. in Bull. Soc. Nat. Mosc. XXIV, 2, 351; Maxim in Mém. biol. XII, 913, f. 162.—*lc.*: Maxim. l.c.; Kom. and Alis. Oprod. rast. Dalnevost. kr. II, tabl. 278.—*Exs.*: Pl. Amur. and Zeaen. No. 40.

795 Perennial. Root stout. Stem erect, very thick, flexuous, ribbed, glabrous, branched from base, up to 80 cm tall. Leaves alternate, petiolate, 3-pinnatisect, glabrous, with incised segments; lobes of segments linear, sharply chondroid-denticulate. Flowers on pedicels (up to 15 mm long in lower flowers) in lax racemose inflorescence at stem and branch tips. Lower bracts leaflike, but intensely reduced, upper 3-partite, with lateral lobes dissected into linear lobules; middle lobe large, rhombic-ovate, dentate. Calyx 8 mm long, campanulate, glabrous, herbaceous, with 10 fine veins, 5-toothed; teeth acute, entire, deltoid, reflexed along margin, 1/2 as long as tube. Corolla apparently yellow, 23-35 mm long, glabrous; galea curved in upper half, villous-ciliate, almost equaling lip; lip 3-lobed, obovate, serrate in front. Stamens with glabrous filaments; anthers with acute spurs. Capsule 12 mm long, suborbicular, abruptly tapering into short beak. Flowering from July to August. Fruiting in August.

In marshes and damp meadows.—*Eastern Siberia*: Dauria; *Soviet Far East*: Uda Region, Zeya-Bureya, Ussuri, Sakhalin. *General distribution*: northeast of China, northern China. Described without mentioning country.

### Genus 1362. *SIPHONOSTEGIA*<sup>1, 2</sup> Benth.

Benth. in Hook. and Arn. Bot. Beech. Voy. (1835) 203; Boiss. Fl. or. IV, 470.—? *Lesquereuxia* Boiss. and Reut. in Boiss. Diagn. pl. or. ser. 1, No. 12 (1833) 43; ser. 2, No. 6 (1859) 132.—*Prismatanthus* Hook. and Arn.l.c.

Flowers axillary, solitary, short-pedicellate or subsessile, forming almost unilateral racemes at ends of virgate branches. Bracteoles 2. Calyx long tubular, slightly narrowed toward limb, with 10(11) very prominent keeled ribs; lobes of limb 5 (rarely 6), subequal, diverging, oblong-linear, leaflike; limb almost bilabiate, upper lip 3-partite, lower 2-partite. Corolla yellow or purple, slightly longer than calyx; tube long, cylindrical or

<sup>1</sup> Treatment by V.F. Golubkova.

<sup>2</sup> From the Greek siphon—tube, and stegē—casing, alluding to long tubular calyx.



slightly inflated; throat open, limb bilabiate; upper lip galealike, compressed, entire or slightly sinuate, with undeflexed margin, equaling lower lip; lower lip slightly diverging, shortly 3-lobed, with two hollow palates at base in form of longitudinal folds. Stamens 4, included under galea, didynamous or subequal, anther lobes obtuse or subobtuse at base, or with very minute cusps. Style filiform; stigma subcapitate, scarcely emarginate. Capsule enclosed in calyx, oblong-linear, subacute, compressed, bilocular and bivalved, loculicidal, with septum consisting of two semisep-  
 796 tums, freely converging in middle of capsule. Seeds numerous, minute, reticulate-rugose. Annual or biennial herbs, pubescent with simple hairs, sometimes mixed with glandular hairs. Leaves almost opposite or upper alternate, petiolate, entire or pinnatisect.

This genus includes four species, of which one grows in Asia Minor, three in Central and East Asia.

1. *S. chinensis* Benth. in Hook. and Arn. Bot. Beech. Voy. (1835) 203; DC. Prodr. X, 538; Maxim. Prim. Fl. Amur. 208; Kom. Fl. Man'chzh. III, 459, 461; Kom. and Alis. Opred. rast. Dalnevost. kr. II, 934.—*lc.*: Benth. in Hook. and Arn. l.c. tab. 44.—*Exs.*: GRF, No. 2363.

Annual or biennial. Root branched. Stems 15–70 cm tall, erect, rigid, generally single, or rarely few, simple or with few appressed branches in upper part, densely leafy, sparsely pubescent below with simple hairs mixed with long-stalked glands or subglabrous, rather densely covered in upper part with short recurved hairs, sometimes reddish. Radical leaves 0.7–5 cm long, 0.3–6 cm broad at base, lower and middle leaves almost opposite, uppermost alternate, narrowed at base into 3–12 mm long petiole, 3–4-pinnatisect; lobes divaricate, linear, dentate or entire, subacute, appressed hispidulous and with stalked glands on both surfaces, along margin and beneath mainly along veins, rarely subglabrous. Floral leaves less dissected, uppermost sometimes 3-lobed, shorter than or (lower) equaling calyx. Flowers in axils of upper leaves on appressed-puberulent, 2–6 mm long pedicels, forming 3–18 cm long raceme. Bracts linear, 4–12 mm long, about 1 mm broad, 1/2 as long as calyx tube or shorter, subacute, hispidulous. Calyx 15–25 mm long, tube 10–18 mm long, with dark green ribs, passing alternately from calyx base toward middle of lobes of limb and between them, whitish scarious between ribs, shortly asperate outside, mainly along ribs due to recurved hairs, glabrous within, lobes of limb oblong, 4–9 mm long, dark green, with vein passing along middle into rib of tube below, slightly thickened or scarcely recurved along margin, shortly setose-asperate outside, mainly along margin and midrib, and completely so inside. Corolla dull yellow, 22–31 mm long; tube narrow, broadened at throat, equaling calyx or slightly longer; galea  
 797 short, 5–7 mm long, falcate, truncate at tip, brownish, with scattered long

hairs outside; lobes of lower lip orbicular, entire, 3–4 mm long and broad (middle slightly larger), puberulent outside. Corolla appressed-hairy inside only in upper part of tube and in throat. Stamens included, lower slightly longer than upper; filaments half adnate with corolla tube, scattered puberulent in lower portion of free part; anthers sagittate or oblong, 2–3 mm long, lobes glabrous, obtuse. Style long, slightly thickened above, curved. Capsule 14–18 mm long, 3–4 mm broad, glabrous, with short beak. Seeds about 1 mm long and 0.5 mm broad, transversely reticulate-rugose, narrowly bordered along one margin. July to September.

Along dry mountain slopes, in forest and inundated meadows in stony soils, in pebbly and sandy places in valleys of rivers and lakes.—*Soviet Far East*: Zeya-Bureya, Ussuri. *General distribution*: Japan, China, Tibet. Described from Macao Island (Japan) and adjacent islands. Type in London.

### Genus 1363. *BUNGEA*<sup>1, 2</sup> C.A.M.

C.A.M. Verz. Pflanz. Cauc. Casp. Meer (1831) 108; Maxim. in Mém. Acad. Sc. Pétersb. VII sér. XXIX, 3 (1881) 59.

Calyx with two bracteoles, with short tube, 8–10 prominent ribs and 4 leaflike long lobes. Corolla bilabiate; upper lip galealike, pointed or bidentate; lower lip 3-lobed. Stamens 4, didynamous; anthers glabrous, lobes transverse, similar, pointed below. Capsule ovate, pointed, shortly loculicidal, almost bilocular at tip as a result of very prominent placentae. Seeds few, rather large, inserted near base, ascending on side, oblong-deltoid, thickened along margin. Perennial herbs with entire opposite lower leaves, 3-partite upper leaves, with sessile flowers in leaf axils.

This genus includes two species, found in Transcaucasia, Asia Minor and western Tien Shan (Maksimovich assigned *Bungea shearereri* S. Moore, described from China, to genus *Monochasma* Maxim.).

1. Upper corolla lip acute, with tooth on either side below tip, lobes of lower lip acute; corolla yellowish (Caucasia)l. *B. trifida* (Vahl) C.A.M.
- 798 + Upper lip very shortly 2-lobed at tip, lobes of lower lip short, obtuse; corolla reddish (Soviet Central Asia)l. *B. vesiculifera* (Herd.) Schischk.

1. *B. trifida* (Vahl) C.A.M. Verz. Pflanz. Cauc. Casp. Meer (1831) 108; Benth. in DC. Prodr. X, 556; Ldb. Fl. Ross. III, 265; Maxim. in Mém. Acad. Sc. Pétersb. VII sér. XXIX, 3, 59; Grossh. Fl. Kavk. III,

<sup>1</sup> Treatment by B.K. Schischkin.

<sup>2</sup> Named after the famous Russian horticulturist-taxonomist and traveler Aleksandr Andreevich Bunge (1803–1890).

405.—*B. szovitsii* Gdgr. in Bull. Soc. Bot. Fr. XI (1914) 45.—*Bartsia trifida* Spreng. Syst. veg. II (1825) 773.—*Rhinanthus trifidus* Vahl, Symb. I (1790) 44.—*Ik.*: Maxim. l.c. tab. 3, f. 1–10.—*Exs.*: Herb. Fl. Cauc. No. 104.

Perennial. Root thick, woody, multiheaded, with reduced shoots in old specimens, thickly covered with scales, producing flower-bearing stems and young shoots also with scale leaves. Scale leaves alternate, obovate or ovate, 3-veined, blackish membranous, with light yellow pubescence along margin, transformed above into opposite connivent leaves. Stem erect, 5–16 cm tall, somewhat densely hispid. Lower cauline leaves narrowly lanceolate often 3-partite at tip or up to 1/2 into 1–2 cm long, 2–3 mm broad lobes, abruptly transforming into larger leaves with linear, acuminate, 3–4 cm long and 1–2 mm broad lobes, somewhat densely pubescent. Flowers short-pedicellate in leaf axils, forming compact inflorescence, up to 1/2–2/3 as long as stem. Bracteoles linear, directly under calyx. Calyx 2.8–4 cm long, pubescent or crispate-hairy only along margin or dorsally; calyx lobes linear, acute, single-veined, several times exceeding tube. Corolla yellow, markedly shorter than calyx, 2.5–3.5 cm long, rather densely pubescent inside and outside, bilabiate; upper lip with two hairy stripes inside, lower lip longer than upper, spreading, up to 1/3 or 1/2 divided into narrowly deltoid, pointed lobes, pubescent inside. Stamens shorter than upper lip, inserted below middle of tube; anthers almost parallel, obovate-oblong, pointed at base. Style almost equaling upper lip. Capsule tapering into beak, 1.6–1.7 cm long including beak, surrounded by withered corolla. Seeds about 4 mm long, ovate or rhombic, rugose, somewhat compressed. May to June.

On stony slopes, in alkaline deserts.—*Caucasus*: southern Transcaucasia, Talysh. *General distribution*: Armenia-Kurdistan, Iran, Asia Minor. Described from Armenia. Type in Paris.

*Note*. Maximowicz (l.c.) reported variation of this species in relation to size of calyx and corolla, pubescence, etc. With available material, it is hardly possible to separate individual races.

- 799     2. *B. vesiculifera* (Herd.) Schischk. comb. nov.—*B. turkestanica* Maxim. in Mém. Acad. Sc. Petersb. VI ser. XXIX, 3 (1881) 61; Fedtsch. Rast. Turkest. 699.—*Ajuga vesiculifera* Herd. in Rgl. and Herd. in Bull. Soc. Nat. Mosc. I (1868) 71.

Perennial. Root thick, woody, multiheaded. Scales on reduced shoots diffusely pubescent. Stem 10–25 cm tall, obscurely puberulent. Lower leaves almost alternate, lanceolate-linear, simple, 1.5–2 cm long, 3 mm broad; other leaves opposite, as long as lower leaves, 3-partite almost up to base, with linear, acuminate, 1 mm broad lobes, longer than internodes, sometimes with short sterile shoots in axils. Flowers on very short pedicels,



forming 2.5–6 cm long raceme; floral leaves similar to cauline leaves, about 3 cm long, almost exceeding calyx. Bracteoles linear, equaling calyx or slightly longer. Calyx 22 mm long, cleft up to middle into deltoid lobes tapering from middle. Corolla equaling calyx, reddish; upper lip shortly bilobed at tip, lower lip broadly ovate, 3-lobed. Stamens 4, inserted in lower half of tube; anthers, ovary and style similar to those in preceding species. Capsule broadly elliptical, 10 mm long. Seeds oblong, smooth. June to July.

On stony and rubbly slopes.—*Soviet Central Asia*: Tien Shan (Talas, Angren, Tashkent, Karatau, Mogol-tau ranges), Syr Darya (Saryagach Station). Endemic. Described from Karatau Range between Boroldai and Bugun rivers. Type in Leningrad.

### Genus 1364. *CYMBARIA*<sup>1, 2</sup> L.

L. Sp. pl. (1753) 618; Benth. in DC. Prodr. X, 556, p.p.; Benth. and Hook. Gen. pl. II, 975, p.p.; Ldb. Fl. Ross. III, 1, 264, p.p.—*Cymbaria* section b. *Eucymba* Endl. Gen. (1839) 693; Rchb. Nom. Gen. pl. (1841) 115; Walp. Rep. III (1844–1845) 399.

Flowers large, few, on rather long pedicels, solitary in axils of middle trisected leaves. Calyx tubular-campanulate, 10(12)-ribbed, cleft up to 1/2 or more into 5 (sometimes 6) narrow and long, linear-lanceolate or lanceolate-subulate lobes, with shorter additional lobes between gaps. Corolla large, yellow, open at throat, much longer than calyx, campanulate-infundibuliform; tube elongated, inflated slightly above base, almost equaling limb or slightly longer; limb bilabiate, upper lip galeate, bilobed, with broad replicate lobes; lower lip with 3 broad, orbicular, recurved lobes, with two hollow palates. Stamens 4, inserted at base of corolla tube or slightly higher, didynamous; two lower stamens longer, almost equaling, or slightly shorter than upper corolla lip; two upper stamens shorter, slightly exceeding corolla tube; filaments broadened and lanate at base; anthers oblique, drooping, sagittate, with lobes free in lower part, cuspidate at base, free above, obtuse. Style filiform, equaling or longer than corolla, curved at tip; stigma subcapitate. Capsule bilocular, bivalved, loculicidal, ovate, with or without beak, coriaceous. Seeds few, irregularly angular, minute, smooth, with narrowly winged border. Perennial short herbs, almost semi-shrubs with sericeous gray or whitish tomentose-villous pubescence. Root almost woody, multiheaded at neck, with imbricate, short, brown scales. Stems numerous, erect, leafy, covered with short, brownish scale leaves at base. Leaves opposite, linear or lanceolate, acute, entire or (middle floral leaves) trisected, sessile.

<sup>1</sup> Treatment by V.F. Golubkova.

<sup>2</sup> From the Greek *cymbos*—cavity, since corolla tube is inflated above base.

This genus comprises four species, growing in central and eastern Asia.

1. *C. dahurica* L. Sp. pl. (1753) 618; Ldb. Fl. Ross. III, 1, 264; Benth. in DC. Prodr. X, 556; Turcz. Fl. baic.-dah. II, 2, 353; Kom. Fl. Man'chzh. III, 437, 461; Kryl. Fl. Zap. Sib. X, 2528.—*lc.*: Pall. ex Schlecht. in Nees, Horae Phys. Berol. tab. 21; Maxim. in Mém. Acad. Sc. Pétersb. sér. VII, XXIX, 3, tab. 4, f. 1–10.—*Exs.*: GRF, No. 476a, 476b.

Perennial. Root vertical, longitudinally fissured and with reddish brown peeling bark. Plant gray or whitish due to dense, long and fine, silky, appressed hairs, especially dense on stems and upper leaves. Stems 8–20 cm tall, bearing flowers in middle or higher, numerous, rarely single, erect, cylindrical, leafy, simple or with slightly diverging, opposite, sterile branches appearing from leaf axils. Leaves sessile, 1.5–3 cm long, 1–5 mm broad; lower leaves lanceolate, upper linear-lanceolate, gradually tapering above and ending into small mucro, entire; middle floral leaves deeply dissected into 3 lobes, with lateral lobes shorter and narrower; all leaves pubescent on both surfaces. Flowers 1–4, on 4–5 mm long pedicels, 801 about 1.5 mm across, appearing from middle leaf axils. Calyx 1.5–2.5 cm long, with two linear-lanceolate, acuminate, 1.3–2 cm long, 2–4 mm broad bracteoles on sides at base, equaling calyx or almost so, campanulate, slightly inflated, dissected up to middle or slightly more into 5 (very rarely 6) subequal, lanceolate-subulate sharp-pointed lobes, with shorter additional tooth between each gap, and with 2, or even 3 teeth between some gaps, appressed-lanate like entire plant outside and on teeth inside: tube covered inside with minute, very short-stalked glands and, mainly along veins, with sparse, fine, long hairs. Corolla large, 3.5–6 cm long, 2.5–3 times as long as calyx, bright yellow; tube equaling limb; upper lip narrowly galeate, shallowly incised into two broad and short, orbicular, replicate, 8–12 mm broad lobes; lower lip with 3 broad, obovate lobes 10–15 mm long, 8–15 mm broad, scarcely pointed at tip; outer corolla surface, excepting replicate lobes of upper lip, less densely pubescent than calyx, with long, appressed, grayish-white hairs in addition to short-stalked or sessile glands; inner corolla surface diffusely appressed-hairy only in throat, otherwise glabrous. Stamens under upper lip, inserted slightly above base of tube; lower stamens almost equaling upper corolla lip, upper slightly exceeding tube; anthers 3–5 mm long, puberulent above at tip. Style exserted, filiform. Capsule slightly shorter than calyx teeth, 10–15 mm long, 6–10 mm broad, ovate, slightly compressed on sides, with or without beak. Seeds 3–4 mm long, 1.5–2.5 mm broad, ovate-trigonus. May to July.

Rubbly mountain slopes, debris, rubbly and sandy steppes, pebble beds.—*Eastern Siberia*: all regions. *General distribution*: Mongolia, Tibet, Japan, China. Described from Dauria. Type in London.

**Genus 1365. *CYMBOCHASMA*<sup>1, 2</sup> (Endl.) Klok. and Zoz**

Klok. and Zoz in Uch. zap. Khar'k. univ. No. 2-3 (1935) 147; Vozn. rosl. URSR (1950) 399.—*Cymbaria* section a. *Cymbochasma* Endl. Gen. (1839) 693; Rchb. Nom. Gen. pl. (1841) 115 ("Cymbochasma"); Walp. Rep. III (1844-1845) 398. *Cymbaria* L. in Benth. in DC. Prodr. X (1846) 556, p.p.; Benth. and Hook. Gen. pl. II (1876) 975, p.p.; Ldb. Fl. Ross. III, 1, 264, p.p.

Flowers large, few, on short pedicels, solitary in axils of lower leaves  
802 at stem base. Bracteoles two. Calyx tubular-campanulate, 10-ribbed, dissected up to middle into 5 broadly subulate lobes, intermediate lobes absent. Corolla large, yellow, much longer than calyx, open at throat; tube elongated, gradually broadened and inflated above, 2 times as long as limb; limb bilabiate; upper lip scaphoid, entire, acute, with margins narrowly deflexed along sides; lower lip with 3 short, subdeltoid lobes and with two hollow palates, lobes narrow, recurved. Stamens 4, didynamous, lower stamens longer with exerted anthers; filaments inserted slightly above base of corolla tube, broadened at base and lanate; anthers oblique, sagittate, free in lower part and cuspidate, slightly diverging, connate at tip, obtuse. Style longer than corolla, curved above, with subcapitate stigma. Capsule bilocular, bivalvate, loculicidal, ovate or oblong-ovate, compressed on sides. Seeds broad-bordered, elliptical, flat. Perennial short herbs, almost semi-shrubs, with densely grayish or whitish silky tomentose pubescence, with multiheaded root, covered with imbricate, short, brown scales near neck. Stems simple, numerous, erect, leafy, with short, brownish scale leaves at base. Leaves opposite, linear-lanceolate, acuminate, all entire.

Monotypic genus; discovery of second species is possible.

1. *C. borysthenica* (Pall.) Klok. and Zoz, in Uch. zap. Khar'k. univ. No. 2-3 (1935) 141; Vozn. rosl. URSR, 400.—*Cymbaria borysthenica* Pall. ex Schlecht. in Nees, Hor. Phys. Berol. (1820) 109; Benth. in DC. Prodr. X, 556; Ldb. Fl. Ross. III, 1, 264; Schmalh. Fl. II, 284.—*Is.*: Pall. ex Schlecht. l.c. tab. 21; Maxim. in Mém. Acad. Sc. Pétersb. sér. VII, XXIX, 3, tab. 4, f. 21-24.—*Exs.*: GRF, No. 1081.

Perennial. Plant densely covered throughout with grayish or whitish silvery tomentum. Root creeping, obliquely descending only near neck. Stem 3-10(15) cm tall, erect, simple, cylindrical, rather densely leafy, flowers appearing at base. Leaves (4)5-20 mm long, 1-3 mm broad, linear-lanceolate, acuminate, entire, tomentose on both surfaces. Flowers 1-4, in

<sup>1</sup> Treatment by V.F. Golubkova.

<sup>2</sup> From the Greek *cymbos*—cavity, and *chasma*—throat, since corolla tube is gradually broadened and inflated at throat.



- axils of lowermost leaves on 1–2 mm long pedicels. Bracteoles 2, sessile at calyx base on sides, shorter than calyx, similar to cauline leaves in size, shape and pubescence. Calyx 10–17 mm long, campanulate, dissected up to half or slightly more into 5 subequal, deltoid-linear, mucronate lobes.
- 803 Corolla 25–35 mm long, 2–2.5 times as long as calyx, pale yellow; tube about 2/3 as long as corolla; upper lip scaphoid, entire, exceeding lower, with 1 mm broad margin deflexed along sides; 3 lobes of lower lip subequal, 2–4 mm long, 1.5–2.5 mm broad. Stamens under upper corolla lip, inserted slightly above base of tube; lower stamens exserted, almost equaling upper corolla lip; upper stamens included in corolla tube, equaling it or slightly exserted; anthers 2–3 mm long. Style exserted. April to May.

Steppes, stony places and ravines.—*European USSR*: Black Sea Region, Lower Don? Crimea? Endemic. Described from Kamennaya Balka near Berislav (now Kachkarovka) and Burgut River between Dnieper and Bug. Type in Berlin.

*Note.* Schmalhauzen (l.c.) reports the species *Cymbaria borysthénica* Pall. from Crimea. Dokhman [in *Izv. Bot. sada SSSR*, XXIX (1930) 543] reports the discovery of this plant near the Salo-Manych Divide. Klovov and Zoz (l.c.), on comparing specimens of *Cymbochasma borysthénica* (Pall.) Klok. and Zoz with diagrams of plants sent by Dokhman, collected by her near the Salo-Manych Divide, suggest that the latter is a separate similar species, distinguished by several features, including a corolla tube with a constriction at the level of the calyx teeth above the palate situated below (and not gradually broadened), lobes of lower lip broadly orbicular, broader than long (and not ligulate or sharply deltoid and longer than broad), capsule rounded at tip (and not obtuse conical) and so on. The material needs further study. We did not see plants from Crimea and the Salo-Manych Divide.

### Genus 1366. *LATHRAEA*<sup>1, 2</sup> L.

L. Gen. pl. ed. 5 (1754) 661.

Flowers in racemes, in axils of covering scales on distinct pedicels, ebracteolate. Calyx campanulate, 4-toothed. Corolla tubular, slightly broadened upward, bilabiate; upper lip entire, keeled, lower 3-lobed. Stamens slightly exserted. Ovary with nectary in front near base in form of fleshy semiround scale (bag). Placentae two, bicornuate or reniform in transverse section. Style long, with discoid concave stigma. Parasite on roots of trees and shrubs, with succulent rootstock of flesh-white color,

<sup>1</sup> Treatment by I.V. Novopokrovsky.

<sup>2</sup> From the Greek *lathraios*—concealed.

densely covered with decussate scales, recurved from tip, with fanlike diverging glandular cavities.

- 804 Eurasian genus with six species, of which only one grows in the USSR, belonging to section *Squamaria* Dumort., distinguished from the other section *Clandestina* Scop. (absent in our flora) by smaller but more numerous flowers, usually numerous seeds and a nectary not in the form of ring surrounding the ovary, but in the form of a tubercle in front at the base of the ovary.

1. *L. squamaria* L. Sp. pl. (1753) 605; Ldb. Fl. Ross. III, 323; Schmalh. Fl. II, 292; Maevsk. Fl. 621, fig. 244; G. Beck in Pflanzenz. IV, 261, 319; f. 21–22; Grossh. Fl. Kavk. 14.—*lc.*: Syreistsch. III. fl. Mosk. gub. III, 174; Fedch. and Fler. Fl. Evrop. Ross., fig. 874; G. Beck, l.c.—*Exs.*: GRF, No. 782.

Perennial. Rootstock branched, branches up to 1 cm thick, densely covered with fleshy, short and broad, ovate, obtuse scales. Flowering stem (including inflorescence) up to 30 cm tall, thick, succulent, with few alternate scales, with only inflorescence appearing above ground. Epigeal part of plant reddish, glandular-hairy, terminating into comparatively long, spicate raceme drooping at tip, dense at first, lax in fruit. Flowers 15–17 mm long on up to 1 cm long pedicels, drooping (horizontal in var. *major* C. Koch = var. *erecta* Boiss.), chasmogamous, underground part cleistogamous. Bract scales alternate, distichous-imbricate, rhombic, narrowly cuneate toward base, obtuse-angular pointed at tip, lilac-pink, paler along margin, angular pointed at tip, lilac-pink, paler along margin, almost as long as calyx. Calyx campanulate, 4-fid, pinkish lilac, sparsely glandular-pubescent along with pedicels; teeth broadly deltoid, acute, two posterior ovate, broader and longer, others ovate-lanceolate, Corolla tubular, slightly broadened upward, glabrous, slightly exceeding calyx, red, crimson-tinted; lower lip often whitish; upper lip carinate (keeled)-compressed, entire, dull pink in var. *major* C. Koch; lower lip with 3 erect, short, obtuse lobes. Corolla tube erect or (in var. *major*) slightly S-shaped. Stamens inserted almost near corolla throat; filaments covered with short papilliform hairs; anthers slightly exerted, lobes somewhat pilose (white-hairy in var. *major* C. Koch), narrowed at tip into short cusp. Ovary ovate, tapering into rather long, glabrous style; stigma capitate-discoid, with transverse groove. Capsule as long as calyx, with numerous orbicular seeds, 1–1.3 mm in diameter, gray when fresh, brownish when dry. April to May.

- 805 In forests.—*European USSR*: Baltic Region, Ladoga-Ilmen, Volga-Kama, Upper Volga, Upper Dnieper, Middle Dnieper, Volga-Don, Black Sea Region, Crimea; *Caucasus*: Ciscaucasia, Dagestan, western and eastern Transcaucasia. *General distribution*: Scandinavia, Central and Atlantic

Europe, Mediterranean Region, Balkan States-Asia Minor, Iran, India-Himalayas. Described from Switzerland. Type in London.

*Note.* Plant becomes black on drying. *Corylus avellana* L. (most common), *Alnus glutinosa* Gärtn., *A. incana* Möñch, *Fagus*, *Fraxinus excelsior* L. (?) are reported as host plants. Beck adds also *Populus alba* L., *P. nigra* L., and *P. tremula* L. All epigeal parts dry up after the flowering stage.



**DIAGNOSES PLANTARUM  
NOVARUM IN TOMO XXII FLORAE  
URSS COMMÉMORATARUM\***

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\* Reproduced from the Russian original.—Translator.



## VERONICA L.

### 1. Sect. **Macrostemon** Boriss. sect. nov.

Inflorescentia densa, brevis, capitata vel oblonga, spiciformis, terminalis; pedicelli breves vel flores subsessiles; calyx quinquepartitus; corolla tubo brevi; capsula subcomplanata, apice obtusa vel subemarginata; semina plana vel planiconvexa rotundata vel elliptica. Folia opposita, superiora interdum alterna tempore florendi approximata, sessilia vel breviter petiolata. Herbae perennes, non elatae, vel suffrutices inter dum caespites densos formantes.

Typus sectionis: *V. macrostemon* Bge.

### 2. Sect. **Stenocarpon** Boriss. sect. nova.

Inflorescentia terminalis densa, capitata vel corymbiformis; flores subsessiles; calyx quinquepartitus; tubus corollae brevis, stylus saepius brevis et erectus; capsula vix complanata, longitudo latitudinem superans, apicem versus saepius attenuata et acutiuscula, ad 4 partes dehiscens. Semina parva, ovata, basi attenuata, apice obtusiuscula. Folia ovata vel lanceolata, acuta, sessilia, remota. Herbae altimontanae, perennes.

Typus sectionis: *V. ciliata* Fisch.

## PEDICULARIS L.

### 3. **P. arguteserrata** Vved. sp. n.

Perennis. Radix abbreviata, fibris funiculatis; caules saepius pauci, simplices, erecti, nitentes, quadrifariam pubescentes, foliorum verticillis 2–3 vestiti, 10–30 cm alt.; folia radicalia interdum nulla, longe petiolata, caulibus 2–3-plo breviora, ambitu lanceolata, pinnatisecta, villis solitariis obsita, segmentis distantibus, lineari-lanceolatis vel sublinearibus, acutis arguteserratis vel interdum subintegris, caulina verticillata vel infima opposita, breviter petiolata vel sessilia, caeterum similia; bracteae infimae foliaceae floribus longiores, mediae et superiores eis breviores, basi dilatatae villosae, ambitu deltoideae, tripartitae, partitionibus laxe serratis, media interdum interatim tripartita. Calyx breviter pedicellatus, eampanulatus, 6–7 mm lg., saepe violaceo suffusus, superne membranaceus, villosus, dentibus e triangulari basi linearibus, acutis, tubo paullo brevioribus; corolla roseo-violacea, 17–18 mm lg., tubo ad os calycis infracto, galea subrecta labio lato trilobato, 7–8 mm longo paullo brevior; filamenta dua pilosa; capsula oblique late oblonga in rostrum breve suberectum subito angustata.



**A f f i n i t a s.** Species e grege *P. amoena* s. l., a *P. amoena* Adams et *P. macrochila* Vved. labio brevior, a *P. Korolkovii* Rgl. fibris radicalibus tenuioribus ab omnibus congregibus serraturae foliorum indole differt.

**H a b i t a t** in pratis nemoralibus in montibus Sibiriae australis et Mongoliae septentrionalis, nec non in montibus Uralensibus.

**T y p u s.** Jugum Sajanense, lacus Man, 1912 VI 21, fl. Tugarinov (Herb. Inst. Bot. Acad. Sc. URSS conservatur).

#### 4. *P. amoeniflora* Vved. sp. n.

Perennis. Radix robusta, ramosa, saepe multiceps; caules simplices, erecti vel adscendentes, sat crassi, glabri, sub inflorescentiam longe villosi, foliorum verticillis 2(3) vestiti, 5–15 cm alt.; folia radicalia nulla, caulina verticillata, infima opposita, petiolis lamina brevioribus suffulta, glabra vel laxe araneoso-pilosa, ambitu lanceolata, pinnatisecta vel pinnatipartita, segmentis triangulari-oblongis vel triangulari-lanceolatis ad rachidem dentatam decurrentibus, acutis acute inaequaliter lobatis vel grosse dentatis. Inflorescentia pluriflora, densissima, saepius elongata; bractae lanceolatae integrae vel summa apice denticulatae, subaraneoso-ciliatae, floribus multo breviores; calyx late campanulatus, 10–12 mm lg., glabriusculus, dentibus acutissimis, integris, subaraneoso-ciliatis, tubo duplo brevioribus; corolla rosea, 20 mm lg., tubo ad os calycis sub angulo recto vel subrecto infracto, galea paullo rursum declinata, subfalcata, sub apice denticulo obtusissimo subconspicuo interdum instructa, labio trilobo, 5–6 mm lg., galea sesqui brevior. Filamenta dua pilosa.

**A f f i n i t a s.** *P. pycnanthae* Boiss. proximisque affinis, sed inter eas corollae tubo ut in *P. amoena* Adams ad os calycis infracto dignoscitur.

**H a b i t a t** ad declivia saxoso-argillosa in regione superiore montium Schugnanicorum (Asia Media).

**T y p u s:** Schugnan, ad trajectum Bidjunt, 1914 V 31, fl., Tuturin et Besedin, n° 695 (Herb. Inst. Bot. Ac. Sc. URSS).

#### 5. *P. Verae* Vved. sp. n.

Perennis. Radix robusta, saepe pluriceps, collo reliquis caulinarum foliorumque radicalium rudimentarium tecto; caules ad 3 cm ait., saepe subnulli, simplices, glabri, ad inflorescentiae rachidem interdum longe villosi sublanative; folia radicalia nulla, caulina opposita vel verticillata, breviter petiolata, tenuiter laxe araneoso-villosa, demum glabrata, ambitu lineari-lanceolata, pinnatisecta vel profunde pinnatipartita, segmentis ad rachidem saepe dentatam decurrentibus, lanceolatis vel triangulari-oblongis, inferne distantibus, superne, in parte minus secta, approximatis, acutis, cartilagineo acuminato serratis vel sublobatis. Inflorescentia capitata vel saepius basi interrupta, araneoso-villosa; bractae infimae foliceae, mediae lanceolate, acuminatae, integrae vel apice serratae, floribus brevioribus; pedicelli ad

20 mm lg., flores superiores sessiles; calyx campanulatus, 10–12 mm lg., p. m. araneoso-villosus, dentibus triangulari-linearibus, acutissimis, integris vel denticulatis, tubo sesqui brevioribus; corolla, videtur, flava, 22–24 mm lg., tubo vix incurvo subrecto, galea paullo rursum declinata, recta, antice omni longitudine truncata edentata edentata edentata tubo duplo brevior, labio trilobo, sat parvo galea paullo brevior; filamenta dua piloso-villosa; capsula 8–10 mm lg., elliptica rostro uncinato.

*A f f i n i s* *P. pulchrae* Pauls., sed floribus flavis galea perfecte edentata differt.

*H a b i t a t* ad declivia saxosa et argillosa in regione superiore montium Pamiralaicorum (Asia Media).

*T y p u s*: Systema fluminis Sardai-minoa; in valle fl. Muschkut, alt. 2800 m., 1934 VII 29, fl. Koroleva et Nikitin, n° 365.

Auxilatrici meae investigatione florum Asiae Mediae V. K. Pazij dedico.

#### 6. *P. inconspicua* Vved. sp. n.

Perennis. Radix verticalis, incrassata, apice ramosa; caulis simplex, 1–2(5) cm alt., glaber vel ad inflorescentiam longe villosulus; folia radicalia nulla, caulina verticillata vel infima opposita, glabra vel villis solitariis obsita, petiolis laminae aequilongis vel ea brevioribus suffulta, ambitu lanceolatae pinnatisectae, rachide inaequaliter dentata, segmentis oblongis vel lanceolatis, acutis profunde lobatis, lobis acutis, cartilagineo acuminatis. Inflorescentia capitata, saepe inferne, interdum valde, interrupta; bracteae infimae interdum foliaceae, mediae e oblonga vel lanceolata basi longe acuminatae apice serratae vel integrae, floribus breviores, longe, praecipue subtus, villosulae; pedicelli ad 8 mm lg., flores superiores sessiles; calyx 10–13 mm lg., subglaber vel, praecipue ad dentes, longe villosulus, tubuloso-campanulatus, fructifer paullo inflatus accrescensque, dentibus triangulari-linearibus, acutissimis, integris, tubo paullo vel sesqui brevioribus; corolla roseolo-lutescens, unicolor, inconspicua, 24–28 mm lg., tubo recto vel subrecto, galea paullo rursum declinata, tubo subduplo brevior, apice incurva, rostro brevi deorsum directo dentibus duobus acutis deorsum directis terminato, labio parvo trilobo, galea subsesqui brevior; filamenta glabra; capsula 10–13 mm lg., elliptica, rostro subobliquo paullo uncinato.

*A f f i n i s* *P. zeravschanicae* Rgl., sed corolla inconspicua, unicolori, roseolo-lutescente, nec flavescens labio purpureo picto differt.

*H a b i t a t* ad declivia argilloso-saxosa vel caementacea humida in regione superiore montium Pamiroalaj austro-occidentalis (Asia Media).

*T y p u s*. Ad declivia argilloso-saxosa montium Tschulbair, ca. cacumen Chodsha-barku, alt. ca. 3400 m, 1929 VII 6, fl. Vvedensky, Herb. Fl. As. Med. n° 922 ineditum. (Herb. Univers. As. Med. in Taschkent).

### 7. *P. Popovii* Vved. sp. n.

Perennis. Radix abbreviata, fibris funiculatis crassis; caules 1–3, debiles, adscendentes, interdum suberecti, longe villosi, 5–10 cm alt.; folia radicalia petiolis laminae aequilongis vel ea brevioribus suffulta, longe villosula, ambitu lanceolata, pinnatisecta, segmentis, ad rachidem vix vel non decurrentibus, oblongis apice paullo acuminatis, pinnatilobatis, lobis paucidentatis, cartilagineo acuminatis; caulina verticillata vel opposita, brevius petiolata minus secta. Inflorescentia densa, spiciformis, 2–6 cm lg.; bracteae oblongae, acutatae, inferiores apice dentatae; calyx pedicello ad 6 mm lg. suffultus, florendi tempore late campanulatus, 11–14 mm lg., demum paullo inflatus, ad 18 mm lg., membranaceus nervis 10 herbaceis percursus, dentibus herbaceis inaequalibus, postico brevior, triangulari, caeteris tubo 2-plo brevioribus, e triangulari basi linearibus, cartilagineo acutatis, integris; corolla videtur roseo purpurea, labio intense purpureo, 18–24 mm lg., glabra, tubo falcato, galea recta antice truncata, edentula, 6–7 mm lg., labio paullo vel sesqui longiore, labio parvo 5–6 mm lt., trilobo, denticulato, lobo medio elongato; filamenta glabra vel duo villosula; capsula 9–10 mm lg., oblique late-ovata subsemirotunda, rostro brevi oblique directo terminata.

A f f i n i s *P. Semenovii* Rgl., sed radice abbreviata fibris funiculatis foliis radicalibus nullis, labio brevior intense purpureo differt.

H a b i t a t ad declivia saxosa et argillosa in regionibus media et superiora montium Pamiralaj septentrionalis.

T y p u s. Montes Sarytau, 1920 VI 10, fl. et fr., M. Popov, n° 506. (Herb. Univer. As. Med. in Taschkent, n° 105967).

Ad honorem viri clarissimi et amicissimi, investigatoris et explicatoris florum Orbis toti celeberrimi M. G. Popov dedico.

### 8. *P. pubiflora* Vved. sp. n.

Perennis. Radix abbreviata, fibris fusiformi incrassatis; caules 1–3, simplices erecti, validi, glabri vel sub inflorescentia villosuli, (5)10–20 cm alt.; folia alterna, radicalia petiolis glabris lamina 1 1/2 –3-plo brevioribus suffulta, supra glabra, subtus villis obsita, rachide anguste alata, ambitu lanceolata, pinnatisecta. Segmentis lanceolatis vel lineari-lanceolatis, inferne p. m. distantibus, superne p. m. approximatis, inciso pinnato-lobatis, lobis sursum directis, cartilagineo acutatis, integris vel cartilagineo pauciserratis, caulina 1–3 diminuta, breviter petiolata, rachide latiore, caeterum similia. Flores (inferiores ad 8 mm) pedicellati inflorescentiam oblongam densam, inferne interdum Interruptam formantes; bracteae infimae foliaceae, mediae lineares, villis longis obsitae, apice cartilagineo dentatae, floribus breviores; calyx tubuloso campanulatus, subherbaceus, nervis 5 validis tenuiter anastomosantibus, glaber vel p. m. dense villosulus, 14–20 mm lg., fructifer subinflatus, dentibus anguste triangularibus acutis



integris, tubo 2-plo brevioribus; corolla pallide flava, dentibus (an semper?) purpureis, extus, praecipue ad galeam, dense minute pubescens, 26–28 mm lg., tubo recto galea sesqui longiore, galea recta apice uncinato curvata breviter rostrata, dentibus duobus deorsum directis instructa, labio parvo trilobo, margine et fauce glabro denticulato galea paulo brevior; filamenta dua villosula; capsula oblique elongato-oblonga, una latere (an semper?) dehiscent, 14–20 mm lg.

A f f i n i s *P. alatauicae* Stadlm., sed corolla pallide flava nec rosea, labio longiore, foliis minus sectis dignoscitur. A *P. songarica* Schrenk et *P. physocalice* Bge. corolla extus minute pubescente, nec glabra, differt.

H a b i t a t in pratis alpinis et subalpinis montium Asiae Mediae.

T y p u s. Inter lapides ad trajectum Ak-tasch in montibus Sonkul-tau (Tian-schan centralis). 1926 VII 22, fl., Sovetkina et Uspenskaja, Herb. Fl. As. Med. n° 136 ineditum. (Herb. Univer. As. Med. in Taschkent).

#### 9. *P. alatauica* Stadlm. in herb.

Perennis. Radix abbreviata, fibris valde fusiformi-incrassatis. Caules 1–3, simplices, erecti vel subflexuosi, validi, tenuiter et saepe dense longe villosuli, 5–15 cm alt.; folia alterna, radicalia petiolis tenuiter villosulis vel subglabris, lamina 2–3-plo brevioribus suffulta, supra glabra, subtus villis longis tenuibus obsita, rachide anguste alata, ambitu lineari-lanceolata, pinnatisecta, segmentis oblongis, obtusatis inferne interdum distantibus, decurrentibus, pinnatipartitis, partitionibus obtusatis saepissimae cartilagineo acutatis, cartilagineo paucidentatis, caulina 1–2 diminuta, brevius petiolata, caeterum similia. Flores breviter (infimi ad 5 mm) pedicellati inflorescentiam oblongam vel elongatam, rarius capitata formantes; bractae infimae foliaceae, mediae e lanceolata p. m. villosa basi lineares, apice cartilagineo dentatae, floribus breviores; calyx tubuloso-campanulatus, submembranaceus, saepius roseo coloratus, nervis 5 validis tenuiter anastomosantibus, subglaber vel p. m. dense longe tenuiter villosulus, 14–17 mm lg., fructifer paulo inflatus, dentibus triangularibus, acutis crispociliatis, tubo 4-plo brevioribus; corolla rosea extus minute pubescens, 28–30 mm lg., tubo recto galea paullo longiore, galea recta apice uncinato curvata breviter rostrata, dentibus deorsum directis instructa, labio saepissime parvo, trilobo, margine et fauce glabro, denticulato, galea sesqui-subduplo brevior; filamenta glabra vel dua villis solitariis obsita; capsula 15–18 mm lg., oblique elongato-oblonga, una latere (an semper?) dehiscent, in rostrum breve rectum subito angustata.

A f f i n i t a s. Proxima *P. pubiflorae* Vved., sed corolla rosea, nec pallide flava, labio brevior, foliis magis sectis dignoscitur. Ab affinibus *P. songarica* Schrenk et *P. physocalyx* Bge. corolla extus pubescente, nec glabra differt.

H a b i t a t ad declivia sicca et in rupibus montium Tianschanicorum, nec non in jugo Alaico.

T y p u s. Alatau transiliensis: in valle fl. Kaschkelen, reg. alp. 1896 VI 21 fl., Brotherus n° 672 (Herb. Univer. Helsingiensis).—Paratypus: Alpes Alexandri: ad fontes fl. Schamsi. reg. silv. super. 1896 V 30, fl., Brotherus, n° 164 (ibid.).

10. *P. grandis* M. Pop. sp. n.

Perennis. Radix fibrosa, fibris paullo incrassatis; caulis solitarius, firmus, crassus, erectus, simplex, imprimis basi villosopubescentibus, 50–80 cm alt.; folia alterna, radicalia et caulina inferiora petiolis villosopubescentibus lamina duplo brevioribus suffulta, ambitu elongato-oblonga, pinnatisecta, segmentis decurrentibus oblongis vel lanceolatis, inaequaliter pinnato incis, lobis inaequiliter acute cartilagineo dentatis, media breviter petiolata, superiora sessilia, minus secta. Inflorescentia basi interrupta, 20–40 cm lg.; bractae imprimis inferiores foliis superioribus similes, superiores saepius tripartitae, partitione media elongata pinnato-cristata; flores sessiles vel inferiores breviter pedicellati; calyx canovillosus, 12–14 mm lg., cylindricus, membranaceus, nervis 5 validis, 5 tenuibus non anastomosantibus, dentibus glabris linearibus, apice spathulatis, minute denticulatis, tubo 2–3-plo brevioribus, postico brevior triangulari integro; corolla flavescens, 30–33 mm lg., tubo recto e calyce paullo exserto, galea a basi falcato-curvata rostro longiore quam lato bidentato instructa, labio trilobo denticulato galeae subaequilongo; filamenta dua villosa, dua glabra vel vix villosa.

A f f i n i s *P. dolichorrhizae* Schrenk, sed galeae rostro in dentes sensim abeunte, nec truncato basi bidentato, differt.

H a b i t a t in nemoribus umbrosis ad pag: Gilan (Asia Media: Pamiralaj occidentalis).

T y p u s. Schachrizjabs, prope pagum Gilan, in umbrosis, 1916 V 19, M. Popov, n° 842 (Herb. Univers. As. Med. in Taschkent, n° 105870). Cotypus: ibid. n° n° 105868 et 105869.

11. *P. talassica* Vved. sp. n. (nom. in. Journ. Turk. Branch. Russ. Geogr. Soc. 16 (1923) 139).

Perennis. Radix fibrosa, fibris paullo incrassatis; caules 1–3 erecti firmi, p. m. villosi, 10–45 cm alt.; folia alterna, radicalia petiolibus villosis lamina duplo brevioribus suffulta, ambitu lanceolata, pinnatisecta segmentis oblongo-lanceolatis vel ovatis pinnatipartitis, partitionibus cartilagineo dentatis, caulina media breviter petiolata, superiora sessilia. Inflorescentia 5–30 cm lg. densa, floribus inferioribus interdum distantibus, pedicellis interdum ad 12 mm lg. suffultis; bractae inferiores fola superioribus similes, superiores tripartitae ambitu rhomboideae; calyx 14–20 mm

lg., campanulato- tubulosus, flavescenti villosus, inaequaliter quinquedentatus, dentibus lateralibus e triangulari basi lanceolatis cartilagineo mucronulatis, cartilagineo denticulatis, postico integro, triangulari, brevior; corolla flava, glabra vel puberula, 25–35 mm lg., tubo recto lato, tubo calycis sublongiore, galea prona subfalcata, rostro brevi bidentato instructa, labio trilobo, galea sesqui brevior interdum basi ciliata, lobo medio rotundato; filamenta glabra vel dua villosula; capsula oblique oblongo- ovata, 18–20 mm lg.

A f f i n i t a s. Proxima *P. Krylovii* Bonati, sed calycibus ex toto villosis dentibus dentatis differt.

H a b i t a t ad declivia saxosa et argilloso-saxosa in regione superiore montium Tian-schan occidentalis (Asia Media):

T y p u s. Ad declivia argilloso-saxosa in regione subalpina montis Tschingan Majoris. 20 VII 1923, fl., Baranov, in Herb. Fl. As. Med. n° 171 sub nomine *P. dubia* editus. (Herb. Univers. As Med. in Taschkent).

## 12. *P. chroorrhyncha* Vved. sp. n.

Perennis. Radix abbreviata, fibris fusiformi incrassatis; caulis simplex erectus, tenuis, pumilus, longe villosus, 5–15 cm alt.; folia alterna, radicalia petiolis villosis lamina 2–3-plo brevioribus suffulta, supra glabra vel subglabra, subtus p. m. villosula, ambitu lanceolata, pinnatisecta, segmentis inferioribus distantibus, superioribus approximatis oblongis vel ovatis cartilagineo acutatis, pinnatipartitis vel profunde pinnatilobatis, partitionibus elongato triangularibus cartilagineo acutatis, integris vel 1–(3)-dentatis, caulina 1–3 diminuta, brevius petiolata vel sessilia, caeterum similia. Flores sessiles vel subsessiles inflorescentiam capitata vel oblongam tenuiter villosam formantes; bracteae infimae foliaceae, mediae calyce paullo longiores, pinnatipartitae, partitionibus infimis linearibus integris, media multo majore cartilagineo lobato cristata; calyx tubuloso-campanulatus, subcoriaceus nervis ramosis, tenuiter longe villosus, 13–18 mm lg., dentibus late triangularibus acutis integris tubo multoties brevioribus; corolla flava apice purpureo suffusa, 30–38 mm lg., tubo recto galeae subaequilongo, lineis duabus pubescentibus ad faucis angulos sitis ornato, galea subprona superne falcata, rostro brevi bidentato instructa, labio magno trilobo denticulato, cihato, ad faucem piloso, galea vix brevior. Filamenta dua villosula.

A f f i n i s *P. Sibthorpii* Boiss., sed corolla apice purpureo colorata, indumento inflorescentiae molli, tenui dignoscitur. A *P. acmodonta* Boiss. dentibus calycinis mucrone cartilagineo destitutis, a *P. daghestanica* Bonati foliorum dissectionis indole differt.

H a b i t a t in pratis alpinis et subalpinis Caucasi Magni.

T y p u s. Ulluguluk, declivia alpina, 8500–9000 ' 10 VII 1913, fl. E et N. Busch Herb. Inst. Bot. Ac. Sc. URSS).



### 13. *P. sibirica* Vved. sp. n.

Perennis. Radix abbreviata, fibris tenuiter longeque fusiforme incrassatis; caulis saepissime solitarius, simplex, erectus, saepissime validus, tenuissime villosus (10)20–40(50) cm alt.; folia alterna, radicalia petiolis tenuiter villosis lamina duplo brevioribus suffulta, supra glabra, subtus ad nervos villis longis obsita, ambitu lanceolata, pinnatisecta, segmentis inferioribus valde distantibus, superioribus sese tegentibus, divaricatum profunde pinnatipartitis cartilagineo acutatis partitionibus laxe inaequaliter cartilagineo serratis, caulina sursum gradatim diminuta, inferne pauca distantia, superne approximata inflorescentiam involucrentia, inferiora breviter petiolata, superiora subsessilia minus secta. Flores subsessiles inflorescentiam denissimam oblongam formantes; bractae infimae foliaceae, mediae subito delimitatae oblongo lanceolatae vel lanceolatae, arachnoideo villosulae, integrae vel paucilobatae, calyce breviores; calyx campanulatus, 11–14 mm lg. subcoriaceus nervis validis tenuiter breviterque ramosis, glaber vel arachnoideo villosulus dentibus brevissimis late triangularibus tubo multoties brevioribus; corolla flava, 26–28 mm lg., tubo recto, galea paullo brevior, galea vix prona, a basi sensim leviterque, apice valde falcata, rostro brevi bidentato instructa, labio trilobo, longe unguiculato, ciliato, galeae subaequilongo; filamenta dua villosula; capsula oblique oblonga apice subcurvata, 10–11 mm lg., calyce sepulta.

A f f i n i t a s. Proxima species *P. comosa* L. a nostra nervis calycinis intermediis tenuibus omnino vel subomnino nullis differt.

H a b i t a t i n pratis et nemoribus lucidis Sibiriae australis.

T y p u s: In vicinitate pag. Sonskoje; prata stepposa, 25 V 1910, fl., Smirnov. (Herb. Inst. Bot. Ac. Sc. URSS).

### 14. *P. uralensis* Vved. sp. n.

Perennis. Radix brevis, fibris paullo fusiformi incrassatis; caules 1(3), simplex, erectus, elatus, tenuiter villosus, 30–80 cm. alt.; folia alterna, radicalia petiolis longe tenuiter villosulis laminae aequilongis vel ea brevioribus suffulta, glabra vel saepius subtus longe tenuiter villosula, ambitu lineari-lanceolata, pinnatisecta, segmentis inferioribus distantibus, superioribus sese tegentibus, inaequaliter pinnatipartitis, cartilagineo acutatis, cartilagineo lobato dentatis, caulina sursum gradatim diminuta in bracteis abunde, inferiora breviter petiolata, superiora sessilia, minus secta, bracteiformia. Flores subsessiles inflorescentiam densam elongatam, fructificatione tempore inferne laxiusculam, longe villosam formantes; bractae infimae foliis superioribus similes, mediae lanceolatae, apice acuminato saepissime cartilagineo serratae, calyce paullo longiores; calyx campanulatus, subcoriaceus, nervis validis tenuiter breviterque ramosis, longe villosulus, 10–11 mm lg., dentibus brevissimis, lato triangularibus,

integris, tubo multoties brevioribus; corolla flava, 22–28 mm lg., tubo recto, galea sesquil brevior, galea vix prona, a basi sensim leviterque, apice valde falcata, rostro brevi bidentato instructa, labio breviter unguiculato, trilobo, ciliato, galea vix brevior; filamenta dua villosula; capsula oblique oblonga, apice subito curvato vel uncinato acuminata.

A f f i n i s *P. venustae* Schangin, sed labio ciliato dignoscitur.

H a b i t a t in pratis et in populetis stepposis montium Uralensium nec non Rossiae europae orientali-septentrionalis et Sibiriae occidentalis.

T y p u s: Distr. Argajasch, lacus Sosnovskoje, prope p. Purino, 11 VII 1930, fl., Lind, n° 495 (Herb. Inst. Bot. Ac. Sc. URSS).

### 15. *P. hyperborea* Vved. sp. n.

Annua. Glaberrima; caulis simplex vel paucae saepe a medio ramosus, 5–10 cm alt.; folia radicalia rosularia diminuta, obovata, sessilia, integra; caulina pauca evidenter alterna, sed per paria approximata, subsessilia, ambitu lanceolata, profunde pinnatipartita, partitionibus lineari-oblongis obtuse grosse dentatis sublobatis, inferiora interdum obovata profunde lobata, floralia p. m. approximata paullo ampliata, ambitu triangularia, caeterum similia. Flores subsessiles vel sessiles in axillis foliorum floralium solitarii; calyx submembranaceus, nervis ramosis, 6–7 mm lg., usque ad medium, postice profundius, bipartita, partitionibus subflabellatim lobatis, lobis inaequalibus, apice dentatis; corolla, videtur, rosea, galea et maculis labii intensioribus, 11–12 mm lg., tubo recto demum gradatim paullo curvato, galea tubo paullo brevior, recta, antice retusa, supra faucem dentibus duobus triangularibus deorsum directis, sub apice interdum eis duobus minutissimis sursum directis instructa, labio trilobo, eciliato, latiore quam lato, galea paullo brevior; filamenta glabra; capsula 6–8 mm lg., oblique lateovata in rostrum subito angustata.

A f f i n i t a s. Proxima *P. Pennellii* Hulten, sed floribus minoribus, labio pro portione galeae brevior, eciliato differt.

H a b i t a t in sphagnetis ad ostia fl. Obj.

T y p u s: Tasovskaja guba, ripa orientalis, ostium fl. Charutta, sphagnetum. 13 VII 1913 fl., Pole et Rozhdestvensky (Herb. Inst. Bot. Ac. Sc. URSS).

16. *P. Pallasii* Vved. nom. n.—*P. lanata* Pall. ex Stev. in Mém. Soc. Nat. Mosc. 6 (1823) 49 in syn. et herb. non Willd. ex Cham. et Schlecht. in Linnaea 2(1827) 583 (p. p.) et 584.

A f f i n i t a s. A *P. Willdenowii* m. (*P. lanata* Willd., l.c.) labio ciliato, nec non area geographica differt.

*P. Pallasii* in peninsula Kamstchatkâ, in Sibiria Ochotensi et ad insulas Kurilenses crescit; *P. Willdenowii* planta americana et groenlandica est, in Sibiriam solum ad peninsulam Tschukotkam descendit.

## LJNARIA L.

17. *L. dolichocarpa* Klok. sp. n.

Perennis. Caulibus 20–50 cm alt. solitariis vel in numero 2–3 a basi ramosis, ramis divaricatis adscendentibus; foliis lineari-filiformibus semicylindricis canaliculatis 2–5 cm lg., 0.1 cm lat. Inflorescentiae laxae 2–5 cm lg.; pedicelli 2–3 mm lg., bracteae pedicellorum longitudine vel paulo breviores; calyx glaber segmentis linearibus paulo acuminatis 1.5–2 mm lg., 1 mm lat. Corolla 8–9(10) mm lg., labio inferiore lobulis rotundatis lateralibus vix majoribus (ca. 2 mm lat.), labio superiore recto usque ad 2 mm sinuato; calcar rectum vel paulo curvatum (6)7–8 mm lg. Capsula elongato-ovata, 6 mm lg., 3–4 mm lat.; semina discoidea late marginata, 3 mm lg. Fl. VI–1.2 VII.

A f f i n i t a s: a *L. dulci* Klok. ramulis adscendentibus, corollis vix majoribus, calcare majore, capsulis elongato-ovatis nec non areis differt.

H a b i t a t in arenosis Sibiriae austro-occidentalis et Kasachstaniae occidentali-septentrionalis.

T y p u s: Kasachstania. Keservatum Naursum-Karagai, 5 VIII 1938. leg. S. Levitzky. (in Leninopoli conservatur).

18. *spirostegia* Ivanina gen. nov.

Calyx oblongo-ovatus, dentibus 5 brevibus, lanceolatis ornatus, corolla lutea, magna, infubdibuliformis, limbo brevi quinquelobato, lobis rotundatis subaequilongis, intus basi filamentorum anulo piloso praedita; stamina 4, corolla multo breviora, filamentis parte inferiore dense pilosis. antheris bilocularis, loculis ovato-oblongis, ad basin confluentibus; granula pollinis campanulato-globosa, 18–19 m. secus axin polarem, trisulcato-triporosa et quadrisulcato-quadruporosa, textura exinae obsolete tenuiter reticulata. Ovarium manifeste biloculare, placentatione centrali-angulata, ovulis numerosis, ovatum, stylo longo, stigmate brevi lato bilobato. Capsula bilocularis, per valvas dehiscens, tota inclusa. Semina parva, ca. 1.2 mm longa, oblongo-lanceolata, spiraliter incurvata, longitudinaliter rugosa. Folia alterna, rotundata vel ovato-oblonga, serrato dentata. Flores solitarii bracteolis 2, in foliorum axillis per totam fere caulis longitudinem locati. Plantae biennes vel perennes dense pilosae caulibus paucis foliatis.

A genere *Triaenophora* Solered. calyce quinque-dentato (nec 15-dentato), seminibus parvis, ca. 1.2 mm longis, spiraliter incurvatis (nec minutissimis ca. 0.3 mm, reticulatis), corollis intus anulo piloso ornata et aliis notis differt.

A genere *Rehmannia* Libosch. habitu (florum dispositione per totam fere caulis longitudinem) et seminibus (oblongo-lanceolatis spiraliter incurvatis), bracteolis 2, ovario manifeste biloculari etc. bene differt.

G e n e r i s t y p u s: *S. bucharica* (B. Fedtsch.) Ivanina.



## **INDEX ALPHABETICUS\***

nominum specierum atque synonymorum plantarum  
in tomo XXII Florae URSS commemoratarum

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- Acaules* Maxim., sect. 509  
*Adyctii* Pojark., subsect. 96  
*Ajuga vesiculifera* Herd. 799  
*Alectorolophus* Hall. 659  
*Alectorolophus aestivalis* Zing. 665  
*Alectorolophus alectorolophus* Stern. 680  
*Alectorolophus alpinus* Stern. 678  
*Alectorolophus angustifolius* Heynh. 676  
*Alectorolophus angustifolius*  $\alpha$ . *typicus* Beck. 676  
*Alectorolophus apterus* Ostenf. 673  
*Alectorolophus borealis* Stern. 679  
*Alectorolophus crista-*  
*galli* M.B. 676  
*Alectorolophus ellipticus* Hausskn. 681  
*Alectorolophus fallax* Stern. 684  
*Alectorolophus glandulosus* Stern. 683  
*Alectorolophus goniotrichus* Stern. 682  
*Alectorolophus grandiflorus*  $\beta$ . *pubens* Wallr. 680  
*Alectorolophus groenlandicus* Ostenf. 678  
*Alectorolophus hirsutus* All. 680  
*Alectorolophus major* ssp. *aestivalis* Zing. 665  
*Alectorolophus major* ssp. *apterus* Stern. 673  
*Alectorolophus major* ssp. *eumajor* Stern. 665  
*Alectorolophus major* ssp. *major* var. *eumajor* Hegi 666  
*Alectorolophus major* ssp. *montanus* Hayek 664  
*Alectorolophus major* ssp. *vernalis* Zing. 666, 667  
*Alectorolophus major* ssp. var. *apterus* Fries 673  
*Alectorolophus mediterraneus* Stern. 682  
*Alectorolophus minor* Dum. 676  
*Alectorolophus minor* var. *fallax* Wimm. et Grab. 684  
*Alectorolophus montanus* Fritsch. 664  
*Alectorolophus parviflorus* Wallr. 676  
*Alectorolophus parviflorus* Wallr. f. *stenophyllus* Beck. 675  
*Alectorolophus patulus* Stern. 680  
*Alectorolophus pectinatus* Behrend. 668  
*Alectorolophus ponticus* Stern. 667  
*Alectorolophus Reichenbachii* Drejer 673  
*Alectorolophus rusticulus* Stern. 677  
*Alectorolophus songaricus* Stern. 671  
*Alectorolophus stenophyllus* Stern. 675  
*Alectorolophus subulatus* Stern. 668  
*Alectorolophus Trixago* M.B. 659  
*Alectorolophus vernalis* Zing. 666  
*Alkekengi officinarum* Moench 64  
*Alkekengi procumbens* Moench 69  
*Alkekengi pubescens* Moench 70  
*Alsinebe* Griseb., sect. 412, 418  
*Amatula* Medic. 42  
*Amatula flava* Medic. 52, 54  
*Ammania caspica* Janka 469  
*Anastomosanthus Stiefelhag.*, sect. 245  
*Androcera* Nutt. 40  
*Androcera citrullifolia* Rydb. 42  
*Androcera lobata* Nutt. 40  
*Androcera rostrata* Rydb. 41  
*Androcera* Bitter, sect. 40  
*Andromonoecum* Bitter, sect. 39  
*Angustifoliae* (Wettst.) Jorgens. subsect. 638  
*Anodon* Bge., sect. 778  
*Antirrhineae* Duby 175  
*Antirrhinoideae* Benth., subordo 175  
*Antirrhinoideae* Wettst., subfam. 175  
*Antirrhinum* L. 225  
*Antirrhinum albifrons* Sibth. 225  
*Antirrhinum arvense* L. 222  
*Antirrhinum arvense*  $\beta$ . L. 223  
*Antirrhinum bipartitum* Vent. 218  
*Antirrhinum canadense* L. 218  
*Antirrhinum chalapense* L. 217  
*Antirrhinum Cymbalaria* L. 175  
*Antirrhinum elatine* L. 177  
*Antirrhinum genistifolium* L. 188  
*Antirrhinum genistaefolium* M.B. 189  
*Antirrhinum hederaceum* Lam. 176  
*Antirrhinum junceum* Pall. 208  
*Antirrhinum Linaria* L. 201  
*Antirrhinum Linaria* M.B. 197



- Antirrhinum macrourum** M.B. 216  
**Antirrhinum majus** L. 226  
**Antirrhinum micranthum** Cav. 224  
**Antirrhinum monspessulanum** Georgi 208  
**Antirrhinum monspessulanum** L. 219  
**Antirrhinum odorum** M.B. 208  
**Antirrhinum orontium** L. 226  
**Antirrhinum Pelisserianum** (L.) DC. 224  
**Antirrhinum reflexum** L. 220  
**Antirrhinum rytidospermum** Fisch. et Mey. 228  
**Antirrhinum spurium** L. 176  
**Antirrhinum striatum** Lam. 219  
**Antirrhinum zangesura** Grossh. 188  
**Arvenses** (Benth.) Wettst., subsect. 222  
**Arvensia** Ronnig., subsect. 537  
**Atropa** L. 71  
**Atropa acuminata** Royle 72, 75  
**Atropa baetica** Willk. 72  
**Atropa belladonna** auct. 73  
**Atropa belladonna** L. 72, 74  
**Atropa belladonna** var. *flava* Pater 73  
**Atropa belladonna** f. *lutea* Döll. 73  
**Atropa caucasica** Kreyer 73, 74  
**Atropa Komarowii** Blin. 72, 74  
**Atropa lutescens** Blin. et Shalyt 74  
**Atropa Paschkewiczii** Kreyer 72, 73  
**Atropa physaloides** Georgi 104  
**Atropa physaloides** L. 116  
**Atropeae** Miers 71  
**Atropeae** Rchb. 71  
**Atropinae** Dun. 71  
**Atropinae** Miers 71  
  
**Bartsia** L. 657  
**Bartsia alpina** L. 657  
**Bartsia glauca** Poir. 504  
**Bartsia gymnandra** L. f. 502, 504, 505  
**Bartsia pallida** L. 531  
**Bartsia trifida** Spreng. 799  
**Bartsia Trixago** L. 659  
**Bartsia versicolor** Pers. 659  
**Bartsia** sect. *Eufragia* Benth. et Hook. 641  
**Bartsia latifolia** Sibth. et Sm. 642  
**Bartsia viscosa** L. 646  
**Bartsia** sect. *Odontites* Benth. et Hook. 647  
**Bartsia odontites** b. *litoralis* Rchb. 655  
  
**Bartsia** sect. *Ortanthia* Benth. et Hook. 647  
**Bartsia lutea** Rchb. 647  
**Beccabunga** (Griseb.) Benth., sect. 468  
**Beccabunga** Fourr., gen. 329, 468  
**Beccabunga anagallis** Fourr. 469  
**Beccabunga vulgaris** Fourr. 476  
**Belladonna** Adans. 71  
**Bellardia** All. 658  
**Bellardia trixago** (L.) All. 659  
**Bradshawia** F. Muell. 529  
**Brugmansia candida** Pers. 109  
**Bungea** C. A. M. 797  
**Bungea Szovitsii** Gdgr. 798  
**Bungea trifida** (Vahl) C. A. M. 798  
**Bungea turkestanica** Maxim. 799  
**Bungea versicolor** (Herd.) Schischk. 799  
**Bungea** Scheareneri S. Moore 795  
  
**Calistachya sibirica** Rafin. 495  
**Calydermos** Ruiz et Pav. 115  
**Calydermos erosus** Ruiz. et Pav. 116  
**Cardia multiflora** Dulac 365  
**Cardia spicata** Dulac 381  
**Carinata** Beauv., subsect. 536  
**Capsicum** L. 57  
**Capsicum angulosum** Mill. 59  
**Capsicum annum abbreviatum** Fingerh. 59  
**Capsicum annum** L. 57  
**Capsicum caerulescens** Bess. 57  
**Capsicum cerasiforme** Mill. 57  
**Capsicum conoides** Mill. 57  
**Capsicum cordiforme** Mill. 57  
**Capsicum fasciculatum** Sturt. 58  
**Capsicum frutescens** auct. 58  
**Capsicum frutescens** L. 59  
**Capsicum grossum** L. 57  
**Capsicum longum** DC. 57  
**Capsicum mexicanum** Hasenb. 58  
**Capsicum pendulum** Willd. 59  
**Capsicum pubescens** Ruiz et Pav. 59  
**Castilleja** L. f. 530  
**Castilleja acuminata** Turcz. 531  
**Castilleja arctica** Kryl. et Serg. 532  
**Castilleja elegans** Malte 533  
**Castilleja pallida** (L.) Kunth 531  
**Castilleja pallida** var. *rubra* Drob. 531  
**Castilleja sibirica** Lindl. 531  
**Castilleja** Post. et Ktze. 530  
**Caulescents** Maxim., sect. 501

- Celsia* L. 170  
*Celsia atroviolacea* Somm. et Lev. 168  
*Celsia aurea* C. Koch 163  
*Celsia coromandeliana* Vahl 173  
*Celsia heterophylla* Desf. 171  
*Celsia Johannis* Bordz. 163  
*Celsia nudicaulis* (Wydł.) B. Fedtsch. 172  
*Celsia orientalis* L. 171  
*Celsia persica* C. A. Mey. 172  
*Celsia Suworowiana* C. Koch 173  
*Celsia Suworowiana* var. *acuminata* Murb. 173  
*Celsia Suworowiana* var. *papillosa* Murb. 173  
*Ceramanthe* Dum. 229  
*Chaenorrhinum* Lge. 226  
*Chaenorrhinum* Klokovi Kotov 228  
*Chaenorrhinum minus* (L.) Simk 228  
*Chaenorrhinum minus* var. *creticola* Schir. 228  
*Chaenorrhinum persicum* auct. 228  
*Chaenorrhinum rytidospermum* (Fisch. et Mey.) Kuprian. 228  
*Chaenorrhinum spicatum* Korov. 228  
*Chaenorrhinum viscidum* (Moench) Simk. 227  
*Chamaedryos* Koch 430  
*Chamaedrys* Griseb., sect 430  
*Chamaedrys* Stroh, sect 481  
*Chamaesaracha echinata* Yatabe 61  
*Chamaesaracha heterophylla* Hemsl. 61  
*Chamaesaracha japonica* Fr. et Sav. 61  
*Chamaesaracha japonica* Makino 61  
*Chamaesaracha sinensis* Hemsl. 61  
*Chamaesaracha Watanabei* Yatabe 61  
*Chelone frutescens* Spreng 309  
*Cheloneae* Benth. 229  
*Ciliate* Jörgens., subsect 568  
*Cochlidiospermum* Rchb., gen. 329, 392  
*Cochlidiospermum agreste* Opiz 408  
*Cochlidiospermum Buxbaumii* Opiz 411  
*Cochlidiospermum digitatum* Opiz 405  
*Cochlidiospermum Friesianum* Opiz 410  
*Cochlidiospermum hederaefolium* Opiz 414  
*Cochlidiospermum Lappago* Opiz 414  
*Cochlidiospermum opacum* Opiz 410  
*Cochlidiospermum praecox* Opiz 406  
*Cretacea* Klok., subsect 221  
*Cyclophyllum* Bge., sect 703  
*Cymbalaria* Medic. 175  
*Cymbalaria cymbalaria* (L.) Wettst. 175  
*Cymbalaria hederacea* (Lam.) S.F. Gray 175  
*Cymbalaria muralis* G. M. Sch. 175  
*Cymbaria* L. 800, 801  
*Cymbaria borysthenica* Pall. 803  
*Cymbaria dahurica* L. 800  
*Cymbaria* sect. a. *Cymbochasma* Endl. 801  
*Cymbaria* sect. b. *Eucymba* Endl. 799  
*Cymbochasma* (Endl.) Klok. et Zoz 801  
*Cymbochasma borysthenica* Pall. 802  
*Dargeria* Decne 526  
*Dargeria linifolia* Dene 527  
*Dargeria pinnatifida* Dene 527  
*Datura* L. 109  
*Datura alba* Nees 112  
*Datura arborea* L. 109  
*Datura Bertolonii* Parl. 111  
*Datura discolor* Bernh. 111  
*Datura fastuosa* L. 114  
*Datura fastuosa* var. *alba* Hook. 112  
*Datura fastuosa* var. *nigra* auct. 114  
*Datura guayaquilensis* Kunth. et Bonpl. 114  
*Datura hummatu*  $\alpha$ . *muricata* Bernh 112  
*Datura inermis* Jacq. 111  
*Datura innoxia* Mill. 113, 114, 115  
*Datura laevis* Hohenack. 116  
*Datura metel* auct. 114  
*Datura metel* L. 112, 113, 114  
*Datura meteloides* DC. 113, 115  
*Datura quercifolia* H.B.K. 111  
*Datura stramonium* var. *tatula* Torr. 109, 110, 111, 112  
*Datura stramonium*  $\beta$ . *chalybea* W. Koch 111  
*Datura tatula* L. 111  
*Datura Wallichii* Dun. 111, 112  
*Datura Wrightii* Rgl. 111  
*Datureae* Wettst. 115  
*Daturinae* G. Don. 108  
*Diacmandra* Bge., sect. 108  
*Diffusae* Benth., sect. 794  
*Digitalis* L. 220  
*Digitalis ambigua* Murr. 514  
*Digitalis aurea* Lindl. 520  
*Digitalis brachyantha* Griseb. 522

- Digitalis ciliata* Trautv. 522  
*Digitalis dasyantha* Pall. 521  
*Digitalis epiglottidea* Brera. 309  
*Digitalis eriostachya* Bess. 525  
*Digitalis ferruginea* auct. 523  
*Digitalis ferruginea* L. 522  
*Digitalis ferruginea* Lam. 525  
*Digitalis grandiflora* All. 520  
*Digitalis grandiflora* Lam. 520  
*Digitalis grandiflora* Mill. 520  
*Digitalis grandiflora* var. *acutiflora* C. Koch 521  
*Digitalis grandiflora* var. *obtusiflora* C. Koch 521  
*Digitalis lanata* Ehrh. 525  
*Digitalis laevigata* C. A. M. 524  
*Digitalis Kotukovii* Ivanina 519  
*Digitalis Milleri* Don 520  
*Digitalis Nervosa* Staud. et Hochst. 524  
*Digitalis ochroleuca* Jacq. 526  
*Digitalis Pichleri* Huter 522  
*Digitalis purpurea* L. 518  
*Digitalis purpurea* × *grandiflora* Mill. 519  
*Digitalis purpurea* f. *caule rubro hort* 519  
*Digitalis purpurea* f. *flore albo hort* 519  
*Digitalis purpurea* f. *gloxiniiflora hort* 519  
*Digitalis purpurea* f. *maculata hort* 519  
*Digitalis purpurea* f. *mnonstrosa hort* 519  
*Digitalis Schischkinii* Ivaniana 523  
*Digitalis thapsi* Bert. 518  
*Digitalis Winterli* Roth. 525  
*Diplophyllum* (Lehm.) Boriss., sect. 412  
*Diplophyllum* Lehm., gen. 329, 392  
*Diplophyllum cardiocarpum* Kar. et Kir. 404  
*Diplophyllum crista-galli* Otto et Walp. 413  
*Diplophyllum hirsutum* Kar. et Kir. 413  
*Diplophyllum veronicaeforme* Lehm. 413  
*Dodartia* L. 318  
*Dodartia orientalis* L. 319  
*Dodartia orientalis* f. *alba* Trautv. 319  
*Dopatrium* Hamilt. 320  
*Dopatrium junceum* (Roxb.) Hamilt. 320  
*Dulcamara* § *Dulcamara* Dun., subsect. 10  
*Dulcamara* (Dun.) Bitter, sect. 10  
*Dulcamara Moench*, gen. 10  
*Dulcamara flexuosa* Moench 15  
*Dulcamara lignosa* Gilib. 15  
*Elatinoides elatine* (L.) Wettst. 177  
*Elephantina* Bertol. 606  
*Elephas* Adans. 686  
*Elephas Columnae* Guss. 687  
*Elephas incurva* G. Don 686  
*Elephas orientalis* Guss. 686  
*Elephas recta* G. Don 687  
*Emmenospermum* C. B. Clarke 553  
*Eriopersicon* C. H. Mull., subgen. 44  
*Eu-Euphrasia* (Wettst.) Jorgens., subgen. 568  
*Eufragia* Gris. 641  
*Eufragia flaviflora* Pavl. 645  
*Eufragia latifolia* Griseb. 642  
*Eufragia latifolia* β. *flaviflora* Bioss. 645  
*Eufragia viscosa* Benth. 645  
*Euhyooscyamus* Wettst., sect. 88  
*Eulycopersicon* C. H. Mull., subgen. 46  
*Eumelampyrum* sect. *Laxiflora* Wettst. subset. 543  
*Eumelampyrum* sect. *Spicata* Wettst. subsect. 536  
*Eumimulus* Gray, sect. 311  
*Euphrasia* L. 557  
*Euphrasia adenocaulon* Juz. 623, 624  
*Euphrasia Alboffii* Chab. 619, 621  
*Euphrasia alpina* Baumgarten 639  
*Euphrasia altaica* Serg. 599, 611  
*Euphrasia amblyodonta* Juz. 613, 614, 615  
*Euphrasia amurensis* Freyn 628, 631, 632, 636  
*Euphrasia amurensis* × *hirtella* Bekr. 628  
*Euphrasia arctica* auct. 605  
*Euphrasia arguta* Kern. 615  
*Euphrasia atripurpurea* (Rostrup) Ostenf. 604  
*Euphrasia balankolica* Juz. 594, 595, 596  
*Euphrasia bakurianica* Juz. 638  
*Euphrasia borealis* (Towns.) Wettst. 592, 594  
*Euphrasia bottnica* Kihlm. 606  
*Euphrasia Brandisii* Freyn 635  
*Euphrasia brevipila* Burn. et Gr. 559, 582, 586, 587, 588



- Euphrasia brevipila** Grossh. 588  
**Euphrasia brevipila** Bum. et Gr. E. parviflora Schagerst. 586  
**Euphrasia brevipila** ssp. *aestivalis* Ganesch 585  
**Euphrasia brevipila** ssp. *praecox* Ganesch 587  
**Euphrasia brevipila** ssp. *serotina* Ganesch 585  
**Euphrasia brevipila** var. *eglandulosa* Lindb. f. 603  
**Euphrasia brevipila** f. *eglandulosa* Lindb. f. 585  
**Euphrasia brevipila** f. *subeglandulosa* Lindb. f. 585  
**Euphrasia carthalinica** Kem.-Nath. 637  
**Euphrasia caucasica** Juz. 587, 588, 589  
**Euphrasia coerulea** Tausch. 601, 602  
**Euphrasia condensata** Jord. 579, 581, 582, 586  
**Euphrasia coronata** W. Bekr. 621, 623  
**Euphrasia curta** Wettst. 600  
**Euphrasia curta** var. *glabrescens* Wettst. 600, 602  
**Euphrasia cyclophylla** Juz. 595, 599  
**Euphrasia daghestanica** Juz. 625  
**Euphrasia disjuncta** Fern. et Wiegand 612  
**Euphrasia drosocalyx** Freyn 611  
**Euphrasia drosocalyx** Syreistsch. 608  
**Euphrasia drosophylla** Juz. 599, 608  
**Euphrasia ericetorum** Jord. 579, 580  
**Euphrasia Fedtschenkoana** Wettst. 590, 591, 619  
**Euphrasia fennica** Kihlm. 559, 628, 633, 634, 636  
**Euphrasia fennica** ssp. *aestivalis* Ganesch. 634  
**Euphrasia fennica** ssp. *praecox* Ganesch. 635  
**Euphrasia fennica** f. *macrantha* Lindb. f. 634, 635  
**Euphrasia foulaënsis** Towns. 604  
**Euphrasia frigida** Pugsl. 592, 593, 594, 599, 604, 605  
**Euphrasia georgica** Kem.-Nath. 574, 577  
**Euphrasia georgica** Kem.-Nath. × *hirtella* Jord. 637  
**Euphrasia glabrescens** (Wettst.) Wünst. 601, 602  
**Euphrasia glutinosa** M. B. 656  
**Euphrasia gracilis** Fr. 601  
**Euphrasia gracilis** f. *pilifera* Ganesch. 604  
**Euphrasia Grossheimii** Kem.-Nath. 607, 608, 614  
**Euphrasia hirtella** Jord. 586, 634, 635, 636, 637, 638  
**Euphrasia hirtella** Jord. s.l. × *E. Grossheimii* Kem.-Nath. 638  
**Euphrasia hirtella** ssp. *aestivalis* Ganesch. 635  
**Euphrasia hirtella** var. *Karoiana* W. Bckr. 628  
**Euphrasia hirtella** var. *ramosa* Freyn 628  
**Euphrasia hirtella** Ostenf. 590  
**Euphrasia hyperbores** Jörgens. 591, 592  
**Euphrasia Irenae** Juz. 574, 475  
**Euphrasia jacutica** Juz. 574, 579, 594  
**Euphrasia Juzepczukii** Denissova 614  
**Euphrasia Kernulariae** Juz. 620  
**Euphrasia Kernerii** Wettst. 615  
**Euphrasia Krassnowii** Juz. 599  
**Euphrasia Krylovii** Serg. 635, 637  
**Euphrasia lapponica** T. E. Fries 639, 640  
**Euphrasia latifolia** L. 642  
**Euphrasia latifolia** Pursh. 605  
**Euphrasia latifolia** Wettst. 593, 594, 605, 606  
**Euphrasia lebardensis** Kem.-Nath. 624  
**Euphrasia lepida** Stank. 635  
**Euphrasia litoralis** Fries 655  
**Euphrasia lutea** L. 647  
**Euphrasia macrocalyx** Juz. 573, 576  
**Euphrasia macrodonta** Juz. 619  
**Euphrasia manshurica** Plachiiij 628  
**Euphrasia Maximowiczii** Wettst. 568, 573  
**Euphrasia micrantha** Brenn. 606  
**Euphrasia micrantha** Rehb. 603, 604  
**Euphrasia minima** Alb. 619  
**Euphrasia minima** Jacq. 586, 606, 607, 608, 614, 615  
**Euphrasia minima** var. *carpathica* Freyn 606  
**Euphrasia minima** Wettst. 605  
**Euphrasia mollis** Ishiyma 612  
**Euphrasia mollis** Ldb. 611, 613  
**Euphrasia mollis** (Ldb.) Wettst. 611, 613  
**Euphrasia montana** Jord. 559, 632  
**Euphrasia Murbeckii** Wettst. 586

- Euphrasia nemorosa* Trautv. 582  
*Euphrasia nemorosa*  $\beta$ . *pectinata* Rchb. 635  
*Euphrasia odontites* L. 650  
*Euphrasia officinalis* L. 557  
*Euphrasia officinalis* auct. 632  
*Euphrasia officinalis* Ldb. 570  
*Euphrasia officinalis* Lge. 605  
*Euphrasia officinalis* Schmalh. 575, 582  
*Euphrasia officinalis* var. *alpestris* Freyn 606  
*Euphrasia officinalis* var. *rigida* Lasch. 580  
*Euphrasia officinalis* var. *salisburgensis* Schleicher 638  
*Euphrasia officinalis* var. *tenuis* Brenn. 587  
*Euphrasia officinalis* A. *Platyphyllae*  $\beta$ . *curta* Rehb. 600  
*Euphrasia officinalis* a. *grandiflora* Wallr. 632  
*Euphrasia officinalis* a. *latifolia* 660  
*Euphrasia officinalis* a. *pectinata* 574  
*Euphrasia officinalis* a. *pectinata* Kryl. 574  
*Euphrasia officinalis* a. *pratensis* Koch 632  
*Euphrasia officinalis* a. *Rostkoviana* Rohrer et Meyer 632  
*Euphrasia officinalis* a. *stricta* C. Koch 660  
*Euphrasia officinalis* a. *vulgaris* Spenner 632  
*Euphrasia officinalis* b. *picta* Celakovsky 616  
*Euphrasia officinalis*  $\alpha$ . *imbricata* Benth. 635  
*Euphrasia officinalis*  $\alpha$ . *latifolia* Ldb. 635  
*Euphrasia officinalis*  $\beta$ . *montana*  $\gamma$ . *curta* 600  
*Euphrasia officinalis*  $\beta$ . *tatarica* Benth. 660  
*Euphrasia officinalis*  $\beta$ . *vulgaris* Ldb. 575, 577, 578, 579, 580, 582, 588, 605  
*Euphrasia officinalis*  $\gamma$ . *alpestris* l. *mollis* Herder 612,  
*Euphrasia officinalis*  $\gamma$ . *alpestris* b. *arctica* Herder 605  
*Euphrasia officinalis*  $\gamma$ . *coerulea* Tausch 601  
*Euphrasia officinalis*  $\gamma$ . *curta* Hartn. 600  
*Euphrasia officinalis*  $\gamma$ . *gracilis* Fr. 503  
*Euphrasia officinalis*  $\gamma$ . *mollis* Ldb. 611, 612  
*Euphrasia officinalis*  $\gamma$ . *tatarica* Boiss. 635  
*Euphrasia officinalis*  $\delta$ . *curta* Fr. 600  
*Euphrasia officinalis*  $\delta$ . *hirtella* Kryl. 635  
*Euphrasia officinalis*  $\delta$ . *minima* Ldb. 621  
*Euphrasia officinalis*  $\delta$ . *tatarica* Bioss. 660  
*Euphrasia officinalis*  $\epsilon$ . *brevipila* Kryl. 582  
*Euphrasia officinalis*  $\epsilon$ . *salisburgensis* Ldb. 660  
*Euphrasia oligadena* Juz. 638  
*Euphrasia onegensis* Cajand. 635, 559  
*Euphrasia ossica* Juz. 624, 626  
*Euphrasia parviflora* Schagerström 600, 601, 602, 603, 604  
*Euphrasia parviflora* var. *curta* Fr. 600  
*Euphrasia parviflora* *pectinata* Ten. 573, 577, 578, 579  
*Euphrasia pectinataeformis* Kryl. et Serg. 574  
*Euphrasia pectinatiformis* Kryl. et Serg. 573  
*Euphrasia peduncularis* Juz. 617, 618, 619  
*Euphrasia petiolaris* Wettst. 621, 622, 623, 624, 625, 626, 608  
*Euphrasia petiolaris* Wettst.  $\times$  *E. hirtella* Jord. 624  
*Euphrasia picta* Wimm. 616  
*Euphrasia polyadena* Gr. et Roux 635  
*Euphrasia praebrevipila* Chitr. 582, 586  
*Euphrasia praecurta* Chitr. 600, 601  
*Euphrasia praerostkoviana* Chitr. 633, 634, 635  
*Euphrasia pratensis* Fr. 632  
*Euphrasia pseudomollis* Juz. 612, 613  
*Euphrasia puberula* Jord. 570  
*Euphrasia pubibunda* Simonk 570  
*Euphrasia ramosa* W. Bekr. 628  
*Euphrasia Regelii* Wettst. 587, 588, 589, 591, 595, 596, 599  
*Euphrasia Reuteri* Wettst. 574, 581, 582  
*Euphrasia rigida* Lasch. 580  
*Euphrasia rigidula* Jord. 603

- Euphrasia Rostkoviana* Hayne 632, 559, 586, 628, 631, 633, 634, 636  
*Euphrasia saamica* Juz. 592  
*Euphrasia salisburgensis* Funk 638, 639, 640  
*Euphrasia Schischkinii* Serg. 570, 573  
*Euphrasia Schlagintweitii* Wettst. 631, 632  
*Euphrasia schugnanica* Juz. 591, 618, 619  
*Euphrasia scottica* Wettst. 604  
*Euphrasia serotina* Lam. 615  
*Euphrasia sevanensis* Juz. 623, 625, 626  
*Euphrasia sibirica* Serg. 573, 574  
*Euphrasia Sosnowskyi* Kem.-Nath. 637, 638  
*Euphrasia speciosa* Kern. 615  
*Euphrasia stricta* Beck. et Szyszylowicz 639  
*Euphrasia stricta* Host. 518, 579, 581  
*Euphrasia stricta* × *curta*? Wettst. 581  
*Euphrasia stricta* var. *pilifera* Kihlman 581  
*Euphrasia subpetiolaris* Pugsl. 618  
*Euphrasia subpolaris* Juz. 579, 593, 594  
*Euphrasia suecica* urb. et Wettst. 581, 587  
*Euphrasia svavnica* Kem.-Nath. 588  
*Euphrasia Syreitschikovii* Govor 573, 574  
*Euphrasia tatarica* Fisch. 570, 573, 574, 575, 577, 578, 579, 594, 601  
*Euphrasia tatarica* Ldb. 635  
*Euphrasia tatrae* Wettst. 606  
*Euphrasia taurica* Ganesch. 627, 628  
*Euphrasia tenuis* (Brenn.) Wettst. 559, 586, 587,  
*Euphrasia tenuis* f. *eglandulosa* et f. *subeglandulosa* (Lindb. f.) 581  
*Euphrasia tenuis* f. *subeglandulosa* × *E. parviflora* Schagerst. 602  
*Euphrasia Townsendiana* Freyn 578  
*Euphrasia Tranzszelii* Juz. 596  
*Euphrasia tricuspidata* Allioni 639  
*Euphrasia Trixago* Vis. 659  
*Euphrasia Uechtritziana* Jung. et Engl. 601, 602  
*Euphrasia ussuriensis* Juz. 569  
*Euphrasia varians* Ganesch. 602, 603  
*Euphrasia verna* Bell. 652  
*Euphrasia versicolor* Halcsy u. Braun 616  
*Euphrasia Willkommii* Freyn 615, 628  
*Euphrasia Willkommii* Wettst. 627  
*Euphrasia viscosa* Pall 656  
*Euphrasia Woronowii* Juz. 626  
*Euphrasiaeae* Benth. trib. 530  
*Euphysalis* Rydb., sect. 68  
*Eusolanum* Bitter, subgen. 8  
*Eustachya coerulea* Rafin. 495  
*Euveronica* Griseb., sect. 356  
*Fasciculata* Murb., sect. 123  
*Fedia maxima* Roem. et Schult 432  
*Fistularia hungarica* Borb. 685  
*Gerardia parviflora* Benth. 527  
*Gerardiaae* Benth. 526  
*Glabri* (Soó) Vass., sect. 664  
*Glandulosi* (Soó) Vass., sect. 683  
*Globiflorae* Benth., sect. 522  
*Grandes* (Benth.) Wettst., sect. 193  
*Grandiflorae* Benth., sect. 517  
*Gratiola* L. 321  
*Gratiola juncea* Roxb. 320, 321  
*Gratiola officinalis* L. 322  
*Gratiola japonica* Miq. 323  
*Gratiolaeae* Wettst. 310  
*Gymnandra* Pall. 500  
*Gymnandra altaica* Willd. 502  
*Gymnandra armena* Boiss. 510  
*Gymnandra borealis* Pall. 502, 504, 505  
*Gymnandra borealis* var. *Pallasii* Trautv. 502  
*Gymnandra dentata* Willd. 505  
*Gymnandra elongata* Willd. 502  
*Gymnandra Gmelini* Cham. et Schlecht. 504  
*Gymnandra gracilis* Willd. 505  
*Gymnandra integrifolia* Willd. 502  
*Gymnandra longiflora* Kar. et Kir. 502  
*Gymnandra minor* Willd. 505  
*Gymnandra ovata* Willd. 504  
*Gymnandra Pallasii* Cham. et Schlecht. 502  
*Gymnandra reniformis* Willd. 504  
*Gymnandra Stelleri* Cham. et Schlecht. 505  
*Gymnandra stolonifera* C. Koch. 510  
*Hedystachys spicata* Fourr. 381



- Heterandra* Franch., subsect. 123  
*Hirsuti* (Soó) Vass., sect. 680  
*Hornemannia bicolor* Willd. 316  
*Hummatu* Rheede 113  
*Hyoscyaminae* Dun. 86  
*Hyoscyamus* L. 86  
*Hyoscyamus afghanicus* Pojark. 90  
*Hyoscyamus albus* L. 96  
*Hyoscyamus aureus* Pall. 98  
*Hyoscyamus biennis* Kreyer 53  
*Hyoscyamus bohemicus* F. W. Schmidt. 95  
*Hyoscyamus bohemicus* var. *integrifolius* (Wallr.) Pojark. 95  
*Hyoscyamus bohemicus* var. *pallidus* (W. et K.) Pojark. 95  
*Hyoscyamus Camerarii* Fisch. et Mey. 90  
*Hyoscyamus Camerarii* *β. villosum* Koch 88  
*Hyoscyamus canariensis* Ker. 97  
*Hyoscyamus kopetdaghi* Pojark. 90  
*Hyoscyamus Kotschyanus* Pojark. 90  
*Hyoscyamus major* Mill. 97  
*Hyoscyamus micranthus* G. Don 98  
*Hyoscyamus niger* auct. 95  
*Hyoscyamus niger* L. 93  
*Hyoscyamus niger β. agrestis* Koch 95  
*Hyoscyamus niger β. annuus* Sims 95  
*Hyoscyamus niger biennis* Corr. 93  
*Hyoscyamus niger spontaneus* Corr. 93  
*Hyoscyamus orientalis* M. B. 104  
*Hyoscyamus pallidus* W. et K. 95  
*Hyoscyamus persicus* Boiss. et Buhse 93  
*Hyoscyamus physaloides* L. 104  
*Hyoscyamus pictus* Roth. 35  
*Hyoscyamus pinnatifidus* Schlecht. 88  
*Hyoscyamus pungens* Griseb. 98  
*Hyoscyamus pusillus* L. 98  
*Hyoscyamus reticulatus* auct. 90, 92  
*Hyoscyamus reticulatus* L. 88  
*Hyoscyamus reticulatus* var. *integrifolius* Boiss. 90  
*Hyoscyamus Scopolia* L. 100  
*Hyoscyamus squarrosus* Griff. 88  
*Hyoscyamus turcomanicus* Pojark. 92  
*Hyoscyamus varians* Vis. 97  
*Hyoscyamus verviensis* Lej. 95  
*Hyoscyamus vulgaris* Neck. 93
- Jasminioides flaccida* Moench 82  
*Kickxia* Dum. 176  
*Kickxia caucasimidi* (Mussin) Kuprian. 178  
*Kickxia elatine* auct. 178  
*Kickxia elatine* (L.) Dum. 176  
*Kickxia spuria* (L.) Dum. 176  
*Laeves* Kuprian., subsect. 203  
*Lagotis* Gaertn. 500  
*Lagotis altaica* (Willd.) Smirn. 502  
*Lagotis borealis* (Pall.) Baill. 503  
*Lagotis decumbens* Rupr. 506  
*Lagotis glabra* var. *Stelleri* Trautv. 505  
*Lagotis glauca* Gaertn. 504  
*Lagotis glauca* Korsh. 503  
*Lagotis glauca* ssp. *australis* Maxim. 506  
*Lagotis glauca* ssp. *borealis* var. *Gmelini* Maxim. 504  
*Lagotis glauca* ssp. *borealis* var. *Pallasii* Maxim. 502  
*Lagotis glauca* var. *Pallasii* Kryl. 501  
*Lagotis Gmelini* Rupr. 504  
*Lagotis Grigorjevi* Krassn. 506  
*Lagotis Iconnikovii* Schischk. 509  
*Lagotis integrifolia* (Willd.) Schischk. 502  
*Lagotis Korolkowii* (Rgl. et Schmalh.) Maxim. 509  
*Lagotis minor* (Willd.) Standl. 505  
*Lagotis Pallasii* (Cham. et Schlecht.) Rupr. 502  
*Lagotis reniformis* Standl. 504  
*Lagotis Stelleri* Rupr. 505  
*Lagotis stolonifera* (C. Koch) Maxim. 510  
*Lagotis uralensis* Schischk. 503  
*Lathraea* L. 803  
*Lathraea squamaria* L. 804  
*Laxiflora* (Wettst.) Soó, sect. 543  
*Leptandra* Nutt., gen. 494  
*Leptandra* (Nutt.) Benth., sect. 494  
*Leptandra angustifolia* Lehm. 494  
*Leptandra sibirica* (L.) Nutt. 495  
*Leptandra tubiflora* Fisch. et Mey. 495  
*Leptorhabdos* Schrenk 526  
*Leptorhabdos Benthiana* Walp. 527  
*Leptorhabdos brevidens* Fisch. 527  
*Leptorhabdos glutinosa* Freyn 527
- Isandra* Franch., subsect. 129

- Leptorhabdos linifolia** (Decne.) Walp. 527
- Leptorhabdos micrantha** Schrenk. 527
- Leptorhabdos parviflora** Benth. 527
- Leptorhabdos parviflora** var. *glutinosa* (Freyn) Ivanina 528
- Leptorhabdos parviflora** var. *linifolia* (Decne.) Ivanina 528
- Leptostemonum** Dun., subgen. 39
- Leptostemonum* Bitter 39
- Lesquereuxia* Boiss. et Reut. 795
- Limosella** L. 324
- Limosella aquatica** L. 324
- Limosella aquatica** var. *diandra* (Krock.) Mart. 325
- Limosella aquatica** var. *tenuifolia* Lej 325
- Linaria** Mill. 178
- Linaria acutiloba** Fisch. 202
- Linaria adzarica** Kem.-Nath. 193
- Linaria albifrons** (Sibth. et Sm.) Spreng. 225
- Linaria altaica** Fisch. 207
- Linaria altaica** Kryl. 215
- Linaria ambigua** M. Pop. 203
- Linaria armeniaca** Chav. 218
- Linaria arvensis** (L.) Desf. 222
- Linaria arvensis**  $\beta$ . Desf. 223
- Linaria baldschuanica** B. Fedtsch. 205
- Linaria bessarabica** Kotov. 197
- Linaria Besseriana** Rchb. 216
- Linaria Biebersteinii** Bess. 97
- Linaria Biebersteinii** Grossh. 97
- Linaria bipartita** (Vent.) Willd. 179, 218
- Linaria brachyceras** (Bge.) Kuprian. 210
- Linaria Bungei** Kuprian. 206
- Linaria buriatica** Turcz. 196
- Linaria calycina** Boiss. et Bal. 188
- Linaria canadensis** (L.) Dum. 179, 218
- Linaria caucasica** Mussin 178
- Linaria chalepensis** (L.) Mill. 179, 217
- Linaria chloraefolia** Rchb. 188
- Linaria cordifolia** Boiss. 219
- Linaria corifolia** Desf. 219
- Linaria corrugata** Karjag. 219
- Linaria cretacea** Fisch. 221
- Linaria cretacea** auct. 221, 222
- Linaria cretica** Kuprian. 221
- Linaria Cymbalaria** (L.) Mill. 176
- Linaria dalmatica** Ldb. 187
- Linaria dalmatica** var. *stegophylla* Bordz. 188
- Linaria dalmatica**  $\beta$ . *grandiflora* Bordz. 187
- Linaria dalmatica** Mill. 189
- Linaria debilis** Kuprian. 215
- Linaria dolichocarpa** Klok. 208
- Linaria dolichoceras** Kuprian. 210
- Linaria dschorochensis** C. Koch. 219
- Linaria dulcis** Klok. 209
- Linaria elatine** Ldb. 178
- Linaria elatine** Mill. 177
- Linaria elymaitica** (Boiss.) Kuprian. 217
- Linaria euxina** Velen. 190
- Linaria fastigiata** B. Fedtsch. 205
- Linaria genistifolia** Boiss. 189
- Linaria genistifolia** (L.) Mill. 188
- Linaria grandiflora** Desf. 187
- Linaria Grossheimii** Kuprian. 201
- Linaria hepatica** Bge. 205
- Linaria iberica** Kem.-Nath. 189
- Linaria imerethica** Kem.-Nath. 189
- Linaria incompleta** Kuprian. 215
- Linaria italica** Trev. 197
- Linaria italica** a. *strictissima* Schur. 197
- Linaria japonica** Miq. 203, 220
- Linaria juncea** Rchb. 208
- Linaria Kantschavelii** Kem.-Nath. 198
- Linaria kokanica** Rgl. 204
- Linaria kopetdaghensis** Kuprian. 194
- Linaria kulabensis** B. Fedtsch. 205
- Linaria kurdica** Boiss. 195
- Linaria kurdica** var. *hajastanica* Bordz. 195
- Linaria lenkoranica** Kuprian. 194
- Linaria leptoceras** Kuprian. 211
- Linaria lineolata**  $\beta$ . *elymaitica* Boiss. 217
- Linaria Loeselii** Schweig. 209
- Linaria Loeselii**  $\gamma$ . *brachyceras* Bge. 210
- Linaria Loeselii**  $\alpha$ . *minor* Ldb. 210
- Linaria macrophylla** Kuprian. 215
- Linaria macroura** auct. 215
- Linaria macroura** Korsh. 215
- Linaria macroura**  $\alpha$ . *simplex* Ldb. 215
- Linaria macroura**  $\beta$ . *Besseriana* Chav. 216
- Linaria macroura**  $\gamma$ . *hepatica* (Bge.) Benth. 205
- Linaria macroura** (M.B.) Chav. 216

- Linaria maeotica* Klok. 197  
*Linaria maritima* Rchb. 209  
*Linaria malampyroides* Kuprian. 202  
*Linaria menisperma* Klok. 221  
*Linaria Meyeri* Kuprian. 212  
*Linaria micrantha* (Cav.) Hoffmg. et Link. 224  
*Linaria minor* Ldb. 227  
*Linaria minutiflora* C. A. Mey. 225  
*Linaria monochroma* Boiss. 190  
*Linaria monspessulana* (L.) Mill. 219  
*Linaria odora* (M. B.) Fisch. 208  
*Linaria odora* Korsh. 207  
*Linaria odora* Schmalh. 209  
*Linaria odora* ssp. *brachyceras* Kuprian. 210  
*Linaria odora*  $\alpha$ . *major* Krylov. 207  
*Linaria odora*  $\beta$ . *brachyceras* Ldb. 210  
*Linaria odora*  $\beta$ . *violacea* Ldb. 206  
*Linaria pedicellata* Kuprian. 211  
*Linaria Pelisseriana* (L.) DC. 224  
*Linaria persica* Boiss. 228  
*Linaria petraea* Stev. 193  
*Linaria pontica* Kuprian. 189  
*Linaria Popovii* Kuprian. 203  
*Linaria praecox* Bge. 206  
*Linaria praecox*  $\beta$ . *ramosa* Kar. et Kir. 207  
*Linaria praedita* Boiss. 190  
*Linaria pyramidata* (Lam.) Spreng. 194  
*Linaria pyramidata* Ldb. 194  
*Linaria pyramidata* O. et B. Fedtsch. 194  
*Linaria ramosa* (Kar. et Kir.) Kuprian. 207  
*Linaria reflexa* (L.) Desf. 220  
*Linaria rupestris* C. A. Mey. 212  
*Linaria ruthenica* Blonski 197  
*Linaria rytidosperma* Boiss. 228  
*Linaria sabulosa* Czern. 190  
*Linaria scenoreina* Juz. 189  
*Linaria segetalis* C. Koch 218  
*Linaria sessilis* Kuprian. 204  
*Linaria Schelkovnikovii* Schischk. 198  
*Linaria schirvanica* Fom. 216  
*Linaria simplex* O. et B. Fedtsch. 223  
*Linaria simplex* M. Pop. 224  
*Linaria simplex* (Willd.) DC. 223  
*Linaria somchetica* Bordz. 198  
*Linaria spuria* (L.) Mill. 178  
*Linaria striatella* Kuprian. 211  
*Linaria stricta* Ldb. 217  
*Linaria syspirensis* C. Koch 193  
*Linaria tesquicola* Klok. 197  
*Linaria transiliensis* Kuprian. 206  
*Linaria turcomanica* Kuprian. 223  
*Linaria uralensis* Kotov. 207  
*Linaria violacea* Mey. 216  
*Linaria viscida* Moench 227  
*Linaria vulgaris* Mill. 201  
*Linaria vulgaris* var. *communis* Kryl. 201  
*Linaria vulgaris* var. *latifolia* Kryl. 202  
*Linaria vulgaris* Kom. et Alis. 202  
*Linaria vulgaris* Fedtsch. 197, 202  
*Lindernia* All. 327  
*Lindernia diffusa* (L.) Wettst. 326  
*Lindernia japonica* Thunb. 316  
*Lindernia pyxidaria* All. 328  
 Lucidae Stiefelbag., subsect. 275  
*Lyciinae* Wettst. 71  
*Lycium* L. 77  
*Lycium barbarum* auct. 78, 84  
*Lycium barbarum* L. 82  
*Lycium barbarum* var. *lanceolatum* (Poir.) C. K. Schn. 83  
*Lycium chinense* Mill. 83  
*Lycium dasystemum* Poir. 84  
*Lycium depressum* Stoks. 78, 80  
*Lycium europaeum* L. 78  
*Lycium europeum* Pall. 80  
*Lycium flaccidum* C. Koch 82  
*Lycium flexicaule* Pojark. 81  
*Lycium halimifolium* Mill. 82  
*Lycium kopetdaghi* Pojark. 85  
*Lycium lanceolatum* Poir. 83  
*Lycium orientale* Miers 78  
*Lycium Potaninii* Pojark. 82  
*Lycium ruthenicum* Murr. 80  
*Lycium ruthenicum* f. *brevifolia* O. Ktze. 80  
*Lycium subglobosum*  $\beta$ . *lanceolatum* Dun. 82  
*Lycium subglobosum*  $\gamma$ . *leptophyllum* Dun. 82  
*Lycium tataricum* Pall. 80  
*Lycium tataricum*  $\beta$ . *minus* Pall. 78  
*Lycium Trewianum* Roem. et Schult. 84  
*Lycium turbinatum* Poir. 82, 83  
*Lycium turcomanicum* auct. 84  
*Lycium turcomanicum* Turcz. 78, 80  
*Lycium t. comanicum filamentosum basi glabris* Lipsky 79  
*Lycium vulgare* Dun. 82



- Lycopersicon* Mill. 42  
*Lycopersicon esculentum* Alef. 50  
*Lycopersicon esculentum* Dun. 55  
*Lycopersicon esculentum* Mill. 55  
*Lycopersicon esculentum* × *L. pimpinellifolium* (Jusl.) Mill. 49  
*Lycopersicon esculentum* ssp. *Humboldtii* (Willd.) Luckwill 49, 50  
*Lycopersicon esculentum* ssp. *intermedium* Luckwill 49, 50  
*Lycopersicon esculentum* ssp. *typicum* Luckwill. 55  
*Lycopersicon esculentum* Mill. s. l. 50  
*Lycopersicon esculentum* Mill. s. *esculentum* Prokh. 55  
*Lycopersicon esculentum* Mill. var. *commune* Bailey 56  
*Lycopersicon esculentum* Mill. var. *esculentum* Prokh. 56  
*Lycopersicon esculentum* Mill. var. *grandiflorum* Bailey 56  
*Lycopersicon esculentum* Mill. var. *validum* Bailey 57  
*Lycopersicon esculentum* Mill. Galeni (Mill.) Luckwill 52, 54  
*Lycopersicon esculentum* Mill. var. Galeni Prokh. 54  
*Lycopersicon esculentum* Mill. var. *pyriforme* (Dun.) Alef. 54  
*Lycopersicon esculentum* Mill. var. *cerasiforme* (Dun.) A. Gray 52, 54  
*Lycopersicon esculentum* Mill. var. *cerasiforme* f. *pyriforme* (Dun.) C. H. Mull 54  
*Lycopersicon esculentum* Mill. var. *vulgare* Bailey 56  
*Lycopersicon* Galeni Mill. 52, 54  
*Lycopersicon Humboldtii* (Willd.) Dun. 49, 50  
*Lycopersicon Humboldtii* var. *intermedium* (Luckwill) Prokh. 50  
*Lycopersicon Humboldtii* var. *Humboldtii* (Willd.) Prokh. 50  
*Lycopersicon Lycopersicon* Britt. a. Brown 50  
*Lycopersicon peruvianum* (L.) Mill 45  
*Lycopersicon pimpinellifolium* (Jusl.) Mill. 47  
*Lycopersicon pomum-amoris* Moench. 50–55  
*Lycopersicon solanum* Medic. 55  
*Lycopersicum* Hill 42  
*Lycopersicum atacamense* Phil. 45  
*Lycopersicum bipinnatifidum* Phil. 45  
*Lycopersicum cerasiforme* Dun. 52, 54  
*Lycopersicum chilense* Dun. 45  
*Lycopersicum commutatum* Roem. et Schult. 45  
*Lycopersicum dentatum* Dun. 45  
*Lycopersicum inodorum* Juss. 47  
*Lycopersicum lycopersicum* (L.) Karst. 50  
*Lycopersicum macrophyllum* Guss. 55, 56  
*Lycopersicum peruvianum* Dun. 45  
*Lycopersicum phillipinarum* Dun. 52, 54  
*Lycopersicum pimpinellifolium* Dun. 47  
*Lycopersicum pyriforme* Dun. 52, 54  
*Lycopersicum puberulum* Phil. 45  
*Lycopersicum racemiforme* Lange 47  
*Lycopersicum racemigerum* Lange 47  
*Lycopersicum spurium* (Gmel.) Link 52, 54  
*Lycopersicum tuberosum* Mill. 8  
*Macrosiphon* Hochst. 529  
*Macrostemon* Boriss., sect 481, 809  
**Mandragora** L. 75  
*Mandragora turcomanica* Mizgir 75  
*Margaranthinae* Baehni 60  
*Marinella* Bubani 533  
*Marinella cristata* Bubani 536  
*Marinella vulgaris* Bubani 552  
**Mazus** Lour 316  
*Mazus japonicus* (Thunb.) O. Ktze. 316  
*Mazus rugosus* Lour. 316  
*Mazus stachydidifolius* (Turcz.) Maxim. 317  
*Mazus vandelliioides* Hance 316  
*Megasperma* (Lehm.) Boriss., sect. 413  
*Megasperma* Lehm., gruppe 413  
*Megista* Fourr., gen 63  
*Megista maxima* Fourr 64  
*Megista* (Fourr.) Rydb., sect. 63  
**Melampyrum** L. 533  
**Melampyrum aestivale** (Ronnig.) Stank. 549  
**Melampyrum Alboffianum** Beauv. 539  
**Melampyrum argyrocomum** Fisch. 541  
**Melampyrum arvense** L. 540  
**Melampyrum arvense** ssp. *argyrocomum* (Fisch.) K.-Pol. 541

- Melampyrum arvense* (Fisch.) *barbatum* (W. et K.) Beauv. var. *erivanicum* Beauv. 542
- Melampyrum arvense* ssp. *elatus* Beauv. 541
- Melampyrum arvense* ssp. *pseudobarbatum* Schur. 541
- Melampyrum arvense* ssp. *Schinzii* Ronnig. 540
- Melampyrum arvense* ssp. *Semleri* Ronnig. et Pöevertl. 540
- Melampyrum arvense* var. *albiflorum* Čelak. 541
- Melampyrum arvense* var. *impunctatum* Godr. 541
- Melampyrum arvense* var. *purpurascens* (Gilib.) Litw. 540
- Melampyrum arvense* subvar. *Schinzii* Beauv. 540
- Melampyrum arvense* subvar. *Semleri* Beauv. 540
- Melampyrum arvense*  $\beta$ . *argyrocomum* Fisch. 541
- Melampyrum arvense*  $\beta$ . *bracteis florib. pollidis* M. B. 541
- Melampyrum arvense*  $\beta$ . *elatus* Boiss. 542
- Melampyrum arvensis*  $\beta$ . *linifolium* C. Koch 542
- Melampyrum barbatum* Benth. 537
- Melampyrum barbatum* Ldb. 538
- Melampyrum carpaticum* Schult. 550
- Melampyrum caucasicum* Alboff 539
- Melampyrum caucasicum* Bge. 538
- Melampyrum caucasicum* Bge. ssp. *Alboffianum* (Beauv.) Soó 539
- Melampyrum caucasicum* Bge. subvar. *b. stenophyllum* Beauv. 538
- Melampyrum caucasicum* f. *latifolium* Gorschk. 538
- Melampyrum caucasicum* Boiss. 537
- Melampyrum chlorostachys* Hohen. 537
- Melampyrum chlorostachyum* Beauv. 537
- Melampyrum coerulescens* Gilib. 543
- Melampyrum coeruleum* Gleditsch. 543
- Melampyrum cretaceum* Czern. 541
- Melampyrum cristatum* L. 536
- Melampyrum cristatum* ssp. *solsitiale* Ronnig. 536
- Melampyrum cristatum* var.  $\gamma$ . *solsitiale* Maly 536
- Melampyrum cristatum* subvar. *eusolsitiale* (Ronnig.) Beauv. 536
- Melampyrum cristatum* f. *purpurascens* Nas. 536, 537
- Melampyrum elatus* Reuter 542
- Melampyrum elatus* f. *linifolium* Beauv. 542
- Melampyrum Grossheimii* K.-Pol. 539
- Melampyrum hastatum* Gilib. 552
- Melampyrum Herbichii* Woloszczak 550
- Melampyrum hyans* Gilib. 549
- Melampyrum iedoense* Miq. 545
- Melampyrum intermedium* (Ronnig.) Stank. 549
- Melampyrum laciniatum* Koshewn. et Zing. 553
- Melampyrum laricetorum* Kern. 550
- Melampyrum moravicum* H. Braun 543
- Melampyrum nemorosum* L. 543
- Melampyrum nemorosum* ssp. *moravicum* (H. Braun) Ronnig. 543
- Melampyrum nemorosum* ssp. *nemorosum* Beauv. var. *polonicum* Beauv. 545
- Melampyrum nemorosum* ssp. *nemorosum* Beauv. var. *polonicum* Beauv. f. *depauperatum* Beauv. 545
- Melampyrum nemorosum* ssp. *typicum* Ganesch. 543, 544
- Melampyrum nemorosum* ssp. *typicum* Ganesch. var. *angustifolium* Ganesch. 545
- Melampyrum nemorosum* ssp. *Zingeri* Ganesch. 544
- Melampyrum nemorosum* var. *angustifolium* Ganesch. 544
- Melampyrum nemorosum* var. *latifolium* Neilreich subvar. *b. moravicum* Beauv. 543
- Melampyrum nemorosum* var. *stiriaceum* Beauv. 543
- Melampyrum nemorosum* var. *stiriaceum* Beauv. f. *microphyllum* Beauv. 543
- Melampyrum nemorosum* var. *stiriaceum* Beauv. f. *nanum* Beauv. 543
- Melampyrum polonicum* (Beauv.) Soó 545
- Melampyrum polonicum* var. *angustifolium* Ganesch. 545

- Melampyrum polonicum* f. *galianum* Soó 545  
*Melampyrum pratense* L. 552  
*Melampyrum pratense* ssp. *vulgatum* (Pers.) (Ronnig.) 552  
*Melampyrum pratense* ssp. *vulgatum* (Pers.) Soó 553  
*Melampyrum pratense* ssp. *vulgatum* var. *vulgatum* Beauv. 552  
*Melampyrum pratense* ssp. *vulgatum* (Pers.) Beauv. var. *vulgatum* Beauv. subvar. *digitatum* Schur. f. *laciniatum* (Kosh. et Zing.) Beauv. 553  
*Melampyrum pratense* var. *integerrimum* Doell. 552  
*Melampyrum pratense* var. *laciniatum* (Koshewn. et Zing.) Schmalh. 553  
*Melampyrum pratense* var. *purpurascens* Aschers. 553  
*Melampyrum pratense* var. *sibiricum* Beauv. 552  
*Melampyrum pratense* var. *vulgatum* Beck. 552  
*Melampyrum purpurascens* Gilib. 540  
*Melampyrum Ronnigeri* Poeverl. 536  
*Melampyrum roseum* Maxim. 545  
*Melampyrum roseum* ssp. *euroseum* Beauv. 545  
*Melampyrum roseum* ssp. *euroseum* Beauv. var. *setaceum* Maxim. f. *genuinum* Beauv. 546  
*Melampyrum roseum* var. *hirsutum* Beauv. 546  
*Melampyrum roseum* var. *setaceum* Maxim. 546  
*Melampyrum roseum* var. *setaceum* Maxim. f. *latifolium* Beauv. 545  
*Melampyrum roseum* var. *typicum* Fr. et Sav. 545  
*Melampyrum roseum* f. *Beauverdii* Soó 545  
*Melampyrum saxosum* Baumg. 551  
*Melampyrum Schinzii* (Ronnig.) Stank. 540  
*Melampyrum Semleri* (Ronnig. et Poeverl.) Stank. 540  
*Melampyrum setaceum* (Maxim.) Nakai 546  
*Melampyrum setaceum* var. *genuinum* Nakai 546  
*Melampyrum setaceum* f. *congestum* Nakai 546  
*Melampyrum setaceum*  $\beta$ . *latifolium* Nakai 549  
*Melampyrum setosum* Kom. 546  
*Melampyrum silvaticum* L. 549  
*Melampyrum silvaticum* ssp. *aestivale* Ronnig. 549  
*Melampyrum silvaticum* ssp. *Herbichii* (Woloszczak.) Soó. 550  
*Melampyrum silvaticum* ssp. *saxosum* (Baumg.) Beauv. 551  
*Melampyrum silvaticum* ssp. *intermedium* Ronnig. et Schinz. 549  
*Melampyrum silvaticum* ssp. *saxosum* (Baumg.) Beauv. var. *Herbichii* Beauv. 550  
*Melampyrum silvaticum* ssp. f. *angustifolium* Gort. 550  
*Melampyrum silvaticum* ssp. f. *latifolium* Hartm. 550  
*Melampyrum solstitiale* Ronnig. 536  
*Melampyrum solstitiale* Stank. 536  
*Melampyrum vulgatum* Pers. 552  
*Melanodyctii* Pojark., subsect. 88  
*Melongena* Dun., sect. 39  
*Melongena* Mill., gen. 39  
*Mimulopsis* Boiss., subsect. 252  
*Mimulus* L. 310  
*Mimulus alectorolophus* Scop. 680  
*Mimulus guttatus* DC. 312  
*Mimulus luteus* Benth. 312  
*Mimulus moschatus* Dougl.-Lindl. 315  
*Mimulus nepalensis* Benth. 315  
*Mimulus nepalensis* Grant 314  
*Mimulus parviflorus* Lindl. 314  
*Mimulus pilosiusculus* H. B. K. 313, 314  
*Mimulus ringens* L. 312  
*Mimulus sessilifolius* Maxim. 315  
*Mimulus stolonifer* Novopokr. 314  
*Mimulus tenellus* Bge. 314  
*Minores* Stern., sect. 675  
*Minutiflora* Benth., sect. 224  
*Monochasma* Maxim., gen. 797  
*Morella* Dun., subsect. 22  
*Morella* (Dun.) Bitter., sect. 22  
*Nathaliella* B. Fedtsch. 511  
*Nathaliella alaica* B. Fedtsch. 511  
*Naviculares* Boriss., subsect. 462



- Nemorosa* Soo, subsect. 543  
*Nicandra* Adans. 115  
*Nicandra physaloides* (L.) Gaertn. 116  
*Nicandreae* Wettst. 117  
*Nicandrinae* Bachi, subtrib. 115  
*Nicotiana* L. 106  
*Nicotiana rustica* L. 108  
*Nicotiana tabacum* L. 106  
*Nicotianeae* G. Don. 105  
*Nicotianinae* Dun. 106  
  
*Obtusiscapulum* Wettst., sect. 543  
*Odontites* Zinn 649  
*Odontites Aucheri* Boiss. 648  
*Odontites breviflora* Rgl. 651  
*Odontites glutinosa* (M. B.) Benth. 656  
*Odontites litoralis* Fries. 655  
*Odontites lutea* Rchb. 647  
*Odontites rubra* Gilib. 650  
*Odontites rubravar. serotina* (Lam.) Prantl. 650  
*Odontites rubravar. verna* Pers. 652  
*Odontites salina* Kotov 652  
*Odontites serotina* (Lam.) Dum. 650  
*Odontites serotina* (Lam.) Rchb. 650  
*Odontites serotina salina* Kotov 652  
*Odontites simplex* Krok. 655  
*Odontites verna* (Ball.) Dum. 652  
*Odontites verna* (Bell.) Rchb. 650  
*Omphalospora* Bess., sect. 392, 418  
*Omphalothrix* Maxim. 640  
*Omphalothrix longipes* Maxim. 640  
*Oreosolen* Hook. 511  
*Oreosolen alaicus* (B. Fedtsch.) Pavl. 511  
*Orientales* Stiefelhag., subsect. 273  
*Ortanthia* (Benth.) Kern. 647  
*Ortanthia Aucheri* (Boiss.) Wettst. 648  
*Ortanthia lutea* (L.) Kern. 647  
  
*Pachistemonum* Dun.—  
*Paederota* Wettst., sect. 492  
*Paederota angustifolia* Turcz. 494  
*Paederota Bonarota* Schangin 486  
*Paederota humilis* Stephan 486  
*Paederota pontica* Rupr. 492  
*Paederota pontica* var. *glabra* Somm. et Lev. 493  
*Paederota sibirica* Walpers 495  
*Paederota tubiflora* Walpers 494  
*Paederotella* (Wulff) Kem.-Nath., gen. 329, 492  
  
*Paederotella* (Wulff) Boriss., subsect. 492  
*Paederotella* Wulff, sect. 492  
*Paederotella pontica* (Rupr.) Kem.-Nath. 492  
*Paederotella teberdensis* Kem.-Nath. 493  
*Paradanthus* Grant., sect. 314  
*Parentucellia* Viv. 641  
*Parentucellia flaviflora* (Boiss.) Nevski 645  
*Parentucellia latifolia* (L.) Caruel 642  
*Parentucellia viscosa* (L.) Caruel 646  
*Pedicularis* L. 687  
*Pedicularis abrotanifolia* auct. 729  
*Pedicularis abrotanifolia* var. *longiflora* Rgl. 729  
*Pedicularis abrotanifolia* M. B. 730  
*Pedicularis abrotanifolia* var. *altaica* Maxim. 731  
*Pedicularis abrotanifolia* var. *glabrescens* Bge. 731  
*Pedicularis abrotanifolia* var. *mongolica* Maxim. 731  
*Pedicularis abrotanifolia* var. *typica* Bge. 731  
*Pedicularis achilleifolia* auct. 762  
*Pedicularis achilleifolia* Steph. 761  
*Pedicularis acmodonta* Boiss. 764  
*Pedicularis Adamsii* Hulten 782  
*Pedicularis adunca* M. B. 774  
*Pedicularis alatauca* Stadlm. 755, 813  
*Pedicularis Alberti* Rgl. 786  
*Pedicularis almaatensis* M. Pop. 755  
*Pedicularis alopecuroides* Adams 782  
*Pedicularis alopecuroides* Stev. 782  
*Pedicularis altaica* Maxim. 772  
*Pedicularis altaica* Steph. 771  
*Pedicularis amoena* Adams 709  
*Pedicularis amoena* auct. 708  
*Pedicularis amoena* Maxim. 705  
*Pedicularis amoena* var. *elatior* Rgl. 705  
*Pedicularis amoena* var. *violascens* Rgl. 710  
*Pedicularis amoeniflora* Vved. 721, 810  
*Pedicularis apodochila* Sugaw. 741  
*Pedicularis araratica* Bge. 795  
*Pedicularis arctica* Adams 784  
*Pedicularis arctica* M. B. 709  
*Pedicularis arctica* R. Br. 783

- Pedicularis arguteserrata* Vved. 706, 809  
*Pedicularis armena* Bge. 705  
*Pedicularis armena* Boiss. et Huet 712  
*Pedicularis atripurpurea* Nordm. 789  
*Pedicularis balkarica* E. Busch. 791  
*Pedicularis brachystachys* Bge. 746  
*Pedicularis breviflora* Bonati 757  
*Pedicularis campylisipho* C. Koch 788  
*Pedicularis capitata* Adams 792  
*Pedicularis carpatica* Pork. 788  
*Pedicularis caucasica* auct. 712  
*Pedicularis caucasica* M. B. 712  
*Pedicularis Chamissonis* Stev. 704  
*Pedicularis cheilanthifolia* Schrenk 713  
*Pedicularis cheilanthifolia* var. *variegata* Rupr. 713  
*Pedicularis chorgossica* Rgl. et Winkl. 719  
*Pedicularis chroorrhyncha* Vved. 767, 815  
*Pedicularis comosa* auct. 764, 767, 768  
*Pedicularis comosa* var. *acmodonta* Boiss. 764  
*Pedicularis comosa* var. *Sibthorpii* Boiss. 766  
*Pedicularis comosa* var. *venusta* Bge. 769  
*Pedicularis compacta* Stev. 748  
*Pedicularis condensata* M. B. 788  
*Pedicularis crassirostris* Bge. 705  
*Pedicularis crassirostris* var. *araratica* Krause 705  
*Pedicularis daghestanica* Bonati 765  
*Pedicularis dasyantha* Hadac 782  
*Pedicularis dasystachys* Schrenk 749  
*Pedicularis Doelingiana* Nordm. 789  
*Pedicularis dolichorrhiza* Schrenk 757  
*Pedicularis dubia* B. Fedtsch. 769  
*Pedicularis elata* Willd. 744  
*Pedicularis erecta* Gilib. 775  
*Pedicularis eriophora* Turcz. 708  
*Pedicularis eriostachys* Ldb. 739  
*Pedicularis exaltata* Bess. 787  
*Pedicularis euphrasiodes* Steph. 738  
*Pedicularis Fedtschenkoi* Bonati 750  
*Pedicularis Fedtschenkoi* Vved. 754  
*Pedicularis Fischeri* Adams 760  
*Pedicularis fissa* Turcz. 758  
*Pedicularis flava* Ldb. 750  
*Pedicularis flava* var. *altaica* Bge. 750  
*Pedicularis flava* var. *conica* Bge. 750  
*Pedicularis flava* Pall. 760  
*Pedicularis foliosa* auct. 787, 788  
*Pedicularis Gobii* Krassn. 786  
*Pedicularis grandiflora* Fisch. 794  
*Pedicularis grandis* M. Pop. 756, 814  
*Pedicularis Hacketii* Graf. 788  
*Pedicularis Hacketii* ssp. *exaltata* Kloster 787  
*Pedicularis hians* Eastw. 783  
*Pedicularis hirsuta* L. 784  
*Pedicularis Hulteniana* Li 703  
*Pedicularis hyperborea* Vved. 777, 817  
*Pedicularis incarnata* L. 747  
*Pedicularis inconspicua* Vved. 724, 811  
*Pedicularis interrupta* Steph. 715  
*Pedicularis karatavica* Pavl. 727  
*Pedicularis Karoi* Freyn 776  
*Pedicularis Kaufmannii* Pinzger 764  
*Pedicularis Koidzumiana* Tatew. et Ohwi 742  
*Pedicularis Korolkovii* Rgl. 707  
*Pedicularis Krylovii* Bonati 762  
*Pedicularis Kusnetzovii* Kom. 732  
*Pedicularis labradorica* Wirsing. 738  
*Pedicularis laeta* Stev. 749  
*Pedicularis lanata* auct. 778, 781, 782  
*Pedicularis lanata* Pall. 781  
*Pedicularis lanata* var. *Bekotowii* Krassn. 786  
*Pedicularis lanata* Willd. 778  
*Pedicularis lanata* var. *alopecuroides* Trautv. 782  
*Pedicularis lanata* var. *dasyantha* Trautv. 782  
*Pedicularis lanata* var. *leiantha* Trautv. 778, 781  
*Pedicularis Langsdorffii* Fisch. 783  
*Pedicularis lanata* var. *gymnostemon* Trautv. 782  
*Pedicularis lanata* var.  $\beta$ . Stev. 778, 781, 782  
*Pedicularis lapponica* L. 775  
*Pedicularis lasiostachys* Bge. 759  
*Pedicularis lepidota* Wimm. 738  
*Pedicularis longiflora* Rudolph 699  
*Pedicularis Ludwigii* Rgl. 729  
*Pedicularis macrochila* Vved. 705  
*Pedicularis mandshurica* Maxim. 756  
*Pedicularis Mariae* Rgl. 772  
*Pedicularis Maximoviczii* Krassn. 728

- Pedicularis myriophylla* Pall. 729  
*Pedicularis nasuta* M. B. 741  
*Pedicularis Nelsonii* R. Br. 793  
*Pedicularis Nordmanniana* Bge. 745  
*Pedicularis nudicaulis* C. Koch 712  
*Pedicularis Oederi* Vahl 785  
*Pedicularis Oederi* var. *rubra* Maxim. 786  
*Pedicularis Olgae* Rgl. 720  
*Pedicularis opsiantha* Ekm. 775  
*Pedicularis Pallasii* Vved. 781, 817  
*Pedicularis palustris* auct. 776  
*Pedicularis palustris* Cham. et Schlecht. 777  
*Pedicularis palustris* L. 775  
*palustris* var. *Willd.* 774  
*Pedicularis* var. *Wlassowiana* auct. 776  
*Pedicularis Panjutinii* E. Busch 790  
*Pedicularis parviflora* Kom. 774  
*Pedicularis parviflora* Kryl. 777  
*Pedicularis peduncularis* M. Pop. 700  
*Pedicularis Pennellii* Hulten 777  
*Pedicularis physocalyx* auct. 754  
*Pedicularis physocalyx* Bge. 750  
*Pedicularis platyrrhyncha* Schrenk 716  
*Pedicularis pontica* Boiss. 712  
*Pedicularis Popovii* Vved. 726, 812  
*Pedicularis proboscidea* Stev. 745  
*Pedicularis procumbens* Gilib. 773  
*Pedicularis pseudo-Karoi* Bonati 776  
*Pedicularis pubiflora* Vved. 754, 812  
*Pedicularis pulchra* Pauls. 722  
*Pedicularis purpurascens* Cham. 783  
*Pedicularis pycnantha* auct. 720  
*Pedicularis pycnantha* Boiss. 719  
*Pedicularis pycnantha* var. *Semenowii* Prain 725  
*Pedicularis resupinata* L. 737  
*Pedicularis rhinanthoides* Schrenk 700  
*Pedicularis rhinanthoides* ssp. *rotundata* Vved. 700  
*Pedicularis rhinanthoides* var. *flaviflora* Bonati 700  
*Pedicularis Romanzovii* Cham. 704  
*Pedicularis rubens* Steph. 760  
*Pedicularis rubens* var. *alata* K. et K. 742, 749  
*Pedicularis rubens* var. *altaica* Bge. 742  
*Pedicularis rubens* var. *alpina* Bge. 758  
*Pedicularis rubens* var. *davurica* Bge. 760  
*Pedicularis rubens* var. *desertorum* Bge. 749  
*Pedicularis Rubinskii* Kom. 774  
*Pedicularis sachalinensis* Miabe et Miyake 774  
*Pedicularis sajanensis* Steph. 789  
*Pedicularis sceptrum* Bge. 793  
*Pedicularis sceptrum-carolinum* L. 793  
*Pedicularis schistostegia* Vved. 770  
*Pedicularis schugnana* B. Fedtsch. 772  
*Pedicularis Semenovii* Rgl. 725  
*Pedicularis sibirica* Vved. 767, 816  
*Pedicularis Sibthorpii* auct. 767  
*Pedicularis Sibthorpii* Boiss. 766  
*Pedicularis Socalskii* Bonati 710  
*Pedicularis songarica* auct. 754  
*Pedicularis songarica* Schrenk 753  
*Pedicularis sphagnicola* Kom. 774  
*Pedicularis spicata* Pall. 781  
*Pedicularis Stelleriana* Pall. 792  
*Pedicularis Stevenii* Bge. 714  
*Pedicularis striata* Pall. 743  
*Pedicularis subrostrata* C. A. M. 711  
*Pedicularis sudetica* auct. 741  
*Pedicularis sudetica* Willd. 739  
*Pedicularis sudetica* var. *gymnostachya* Trautv. 741  
*Pedicularis sudetica* var. *macrodontha* K. et K. 753  
*Pedicularis sumana* var. *exaltata* Limpr. 787  
*Pedicularis sylvatica* L. 773  
*Pedicularis talassica* Vved. 762, 814  
*Pedicularis tanacetifolia* Adams 739  
*Pedicularis tanacetifolia* Bge. 749  
*Pedicularis Tatianae* Bordz. 788  
*Pedicularis teucriifolia* Stev. 738  
*Pedicularis tianschanica* Rupr. 703  
*Pedicularis transsilvanica* Schur 788  
*Pedicularis tristis* L. 736  
*Pedicularis tubiflora* Fisch. 699  
*Pedicularis uliginosa* Rge. 742  
*Pedicularis uncinata* Steph. 747  
*Pedicularis uralensis* Vved. 768, 816  
*Pedicularis Verae* Vved. 723, 810  
*Pedicularis venusta* Schangin 769  
*Pedicularis venusta* var. Maxim. 770  
*Pedicularis venusta* var. *Schmidtii* Nakai 770  
*Pedicularis versicolor* Wahlenb. 785  
*Pedicularis verticellata* auct. 705



- Pedicularis verticillata* L. 714  
*Pedicularis villobracteata* C. Koch 789  
*Pedicularis villosa* Ldb. 740  
*Pedicularis villosa* var. *glabrata* Trautv. 741  
*Pedicularis violascens* Schrenk 789  
*Pedicularis Vlassoviana* Stev. 776  
*Pedicularis Waldheimii* Bonati 727  
*Pedicularis Willdenovii* Vved. 778  
*Pedicularis Wilhelmsiana* Fisch. 791  
*Pedicularis yezoënsis* Maxim. 737  
*Pedicularis zeravschanica* auct. 723, 724  
*Pedicularis zerawschanica* Rgl. 723  
*Pentagonia* Heist. 115  
*Pentastemon* L'Herit. 308  
*Pentastemon frutescens* Lamb. 309  
*Pharyngodon* Bge., sect. 774  
*Phtheirospermum* Bge. 555  
*Phtheirospermum chinense* Bge. 555  
*Physaliastrum* Makino 60  
*Physaliastrum chamaesarachoides* Mak. 61  
*Physaliastrum echinatum* (Yatabe) Myk. 61  
*Physaliastrum japonicum* (Fr. et Sav.) Honda 61  
*Physaliastrum japonicum* Kitamura 61  
*Physaliastrum Kumurai* Mak. 61  
*Physaliastrum Savatieri* (Bak.) Mak. 61  
*Physalidinae* Baehni 62  
*Physalis* L. 62  
*Physalis aequata* Jacq. f. 68, 69  
*Physalis alkekengi* auct. 65, 67  
*Physalis alkekengi* L. 64  
*Physalis angulata* L. 69  
*Physalis Bunyardi* Mak. 66  
*Physalis daturaefolia* Lam. 116  
*Physalis edulis* Sims 70  
*Physalis esculenta* Salisb. 70  
*Physalis Franchetii* Mast. 66  
*Physalis Franchetii* var. *Bunyardii* Kitag. 65  
*Physalis Franchetii* var. *Bunyardi* Mak. 66  
*Physalis halicacabum* Crantz 64  
*Physalis glabripes* Pojark. 65, 67, 68  
*Physalis hirsuta* Dun. 69  
*Physalis ixocarpa* Brot. 68  
*Physalis peruviana* L. 70  
*Physalis peruviana* Mill. 116  
*Physalis praetermissa* Pojark. 67, 68  
*Physalis pubescens* L. 69  
*Physalis pubescens* R. Br. 70  
*Physalis ramosa* Mill. 69  
*Physalis* subgen. *Alkekengi* Bitt. 63  
*Physalodes* Boehm. *peruvianum* Ktze. 115, 116  
*Physochlaena* Miers 103  
*Physochlaena dahurica* Miers 104  
*Physochlaena dubia* Pascher 104  
*Physochlaena physaloides* Miers 104  
*Physochlaena pseudophysaloides* Pascher 104  
*Physochlaina* G. Don 103  
*Physochlaina orientalis* (M. B.) G. Don . 104  
*Physochlaina physaloides* (L.) G. Don . 104  
*Physochlaina Semenowii* Rgl. 105  
*Planiconvexae* Boriss., subsect. 430  
*Pratensia* Soo, subsect. 552  
*Prismatanthus* Hook. et Arn. 795  
*Probosciphora* Neck. 686  
*Protocryptocarpum* Bitt., sect. 42  
*Pseudolysimachia* C. Koch., sect. 367  
*Pseudolysimachion* Opiz., gen. 329, 367  
*Pseudolysimachion cristatum* Opiz 384  
*Pseudolysimachion longifolium* Opiz 368  
*Pseudolysimachion spicatum* Opiz 381  
*Pseudosolanoideae* Wettst., subfam. 122  
*Psolanum* Neck. 42  
*Pycnanthium* Boiss. pro sect. 275  
  
**Rhamphicarpa** Benth. 529  
**Rhamphicarpa** Medwedewii Alb. 529  
**Rhinantheae** Wettst. 530  
**Rhinanthoideae** Wettst., subfam. 329  
**Rhinanthus** L. 596  
**Rhinanthus abbreviatus** (Murb.) Schinz. 684  
**Rhinanthus aestivalis** (Zing.) B. Schischk et Serg. 665  
**Rhinanthus alectorolophus** (Scop.) Poll. 680  
**Rhinanthus alectorolophus** ssp. *buccalis* Stern. 673  
**Rhinanthus alectorolophus** (Scop.) Pall. grex *medius* l. typus Soó 680  
**Rhinanthus alectorolophus** ssp. *patulus* Soó 680

- Rhinanthus alectorolophus* γ. *patulus* Chab. 680  
*Rhinanthus alpinus* Lam. 657  
*Rhinanthus alpinus* Baumg. 678  
*Rhinanthus alpinus* ssp. *carpaticus* Soó 678  
*Rhinanthus alpinus typus* Soo 678  
*Rhinanthus angustifolius* Čelak. 664  
*Rhinanthus angustifolius* Gmel. 675  
*Rhinanthus apterus* (Fries) Ostenf. 673  
*Rhinanthus arcticus* (Stern.) Vass. 679  
*Rhinanthus arvensis* Chab. 681  
*Rhinanthus borealis* (Stern.) Druce 679  
*Rhinanthus cretaceus* Vass. 666  
*Rhinanthus colchicus* Vass. 681  
*Rhinanthus crista-galli* var. *mediterraneus* Fiori 682  
*Rhinanthus crista-galli* var. *minor* Döll 676  
*Rhinanthus crista-galli* var. *rusticulus* (Chab.) Soó 677  
*Rhinanthus crista-galli* var. α *angustifolia montana* L. 675  
*Rhinanthus crista-galli* β. *angustifolius* Gaud. 676  
*Rhinanthus elephas* L. 687  
*Rhinanthus elephas* var. *erecta* Boiss. 687  
*Rhinanthus ellipticus* (Hausskn.) Schinz et Thell. 681  
*Rhinanthus fallax* (Wimm. et Grab.) Chab. 684  
*Rhinanthus ferganensis* Vass. 672  
*Rhinanthus glauca* Poir. 504  
*Rhinanthus groenlandicus* (Ostenf.) Chab. 678  
*Rhinanthus* Handel-Mazzetianus ssp. *armeniacus* Soó 682  
*Rhinanthus hirsutus* (All.) Greml. 680  
*Rhinanthus hungaricus* (Borb.) Soó 685  
*Rhinanthus major* Ehrh. 660  
*Rhinanthus major* L. 680  
*Rhinanthus major* ssp. *aestivalis* Soó 665  
*Rhinanthus major* ssp. *eumajor* Schinz. et Thell. 666  
*Rhinanthus major* var. *Fetissioianus* Chab. 685  
*Rhinanthus major* var. *glabra* Rchb. 667  
*Rhinanthus major* var. *glandulosus* Simk. 683  
*Rhinanthus major* β. *hirsutus* Velen. 683  
*Rhinanthus major* l. *typus* Soo 660  
*Rhinanthus mediterraneus* (Stern.) Adamovic 682  
*Rhinanthus minor* L. 676  
*Rhinanthus minor* var. *rusticulus* Chab. 677  
*Rhinanthus minor* var. *septentrionalis* Kihl. 677  
*Rhinanthus minor* var. *stenophyllus* Schur. 675  
*Rhinanthus montanus* Saut. 664  
*Rhinanthus nigricans* Meinsh. 675  
*Rhinanthus orientalis* L. 686  
*Rhinanthus ösilensis* (Ronn. et Saars.) Vass. 684  
*Rhinanthus patulus* (Stern.) Thell. et Schinz. 680  
*Rhinanthus pectinatus* (Behrend.) Vass. 668  
*Rhinanthus ponticus* (Stern.) Vass. 667  
*Rhinanthus pseudomontanus* V. Krecz. 685  
*Rhinanthus pseudosongoricus* Vass. 685  
*Rhinanthus Reichenbachii* (Drej.) Benth. 673  
*Rhinanthus rumelicus* Velen. 683  
*Rhinanthus rumelicus* ssp. *ösilensis* Ronn. et Saars. 684  
*Rhinanthus rumelicus* ssp. *Simonkaianus* Soó 684  
*Rhinanthus rumelicus* Velen. *typus* Soó 683  
*Rhinanthus rusticulus* (Chab.) Druce 677  
*Rhinanthus sachalinensis* Vass. 675  
*Rhinanthus Schischkinii* Vass. 683  
*Rhinanthus serotinus* Schinz et Thell. 664  
*Rhinanthus songaricus* (Stern.) Fedtsch. 671  
*Rhinanthus songaricus* ssp. *riparius* Vass. 672  
*Rhinanthus stenophyllus* (Schur) B. Fedtsch. 675  
*Rhinanthus strictus* C. Koch 687  
*Rhinanthus subulatus* (Stern.) Soó 668  
*Rhinanthus subulatus* (Stern.) Soó ssp. *pectinatus* (Behrend.) Soo 668  
*Rhinanthus transsilvanicus* Söo 679  
*Rhinanthus trifidus* Vahl 796  
*Rhinanthus Trixago* L. 659  
*Rhinanthus Wagneri* Deg. 684

- Rhinanthus vernalis* (Zing.) B. Scshisck. et Serg. 666  
*Rhinanthus villosus* Pers. 680  
*Rhynchosorys* Griseb. 686  
*Rhynchosorys elephas* (L.) Griseb. 687  
*Rhynchosorys orientalis* (L.) Benth. 686  
*Rhynchosorys strictus* C. Koch 687  
*Rhyncholopha* Bge., sect. 732  
  
*Sarachinae* Baehni 57  
*Sceptrum* Bge., sect. 793  
*Scopolia* Jacq. 99  
*Scopolia carniolica* Jacq. 100  
*Scopolia carniolica* var. *brevifolia* Dun. 100  
*Scopolia carniolica* var. *longifolia* Dun. 100  
*Scopolia caucasica* Kolesnik. 100  
*Scopolia physaloides* Dun. 104  
*Scopolia trichotoma* Moench 100  
*Scopolia tubiflora* Kreyer 100  
*Scopolina* Schult. 99  
*Scopolina atropoides* Schult. 100  
*Scopolina carniolica* Schur 100  
*Scopolina Hladnikiana* Freyn 100  
*Scopolina viridiflora* Freyn 100  
*Scorodonia* G. Don, sect. 252  
*Scrophularia* L. 229  
*Scrophularia alata* Gilib. 270  
*Scrophularia alata*  $\beta$ . *cordata* Boiss. 271  
*Scrophularia alata* A. Gray 271  
*Scrophularia altaica* Murr. 261  
*Scrophularia amgunensis* F. Schmidt 265  
*Scrophularia amplexicaulis* Benth. 252  
*Scrophularia Ani* C. Koch 302  
*Scrophularia aquatica* L. 271  
*Scrophularia aquatica* auct. 270  
*Scrophularia armeniaca* Bordz. 286  
*Scrophularia atropatana* Grossh. 280, 279, 297  
*Scrophularia auriculata* Scop. 259  
*Scrophularia betonicaefolia* Wydl. 259  
*Scrophularia bicolor* Gueldenst. 302  
*Scrophularia bicolor* Sibth. 301  
*Scrophularia byzantina* Benth. 248  
*Scrophularia calycina* Boiss. 249  
*Scrophularia calycina* Grossh. 250  
*Scrophularia canescens* Bong. 298  
*Scrophularia canescens* var. *glabrata* Trautv. 298  
  
*Scrophularia canina* L. 301  
*Scrophularia caucasica* S. et Lev. 288, 289  
*Scrophularia Charadzei* Kem.-Nath. 278  
*Scrophularia chlorantha* Kotschy et Boiss. 258  
*Scrophularia chlorantha* var. *adzharica* Woron. 259  
*Scrophularia chlorantha* var. *chrysantha* Jaub. et Spach 249  
*Scrophularia chlorantha* var. *intermedia* Somm. et Lev. 249  
*Scrophularia chlorantha* var. *lunariifolia* Albov. 250  
*Scrophularia chrysanthemifolia* Willd. 301  
*Scrophularia clandestina* Rupr. 246  
*Scrophularia Clausii* Boiss. et Buhse. 251  
*Scrophularia congesta* Stev. 249  
*Scrophularia cretacea* Fisch. 297  
*Scrophularia czapandaghii* B. Fedtsch. 304  
*Scrophularia Czernjakowskiana* B. Fedtsch. 272  
*Scrophularia decipiens* Boiss. et Kotschy. 292  
*Scrophularia decumbens* Fisch., Mey. et Ave-Lall. 259  
*Scrophularia diffusa* Somm. et Lev. 302  
*Scrophularia dissecta* (B. Fedtsch.) Gorschk. 300  
*Scrophularia divaricata* Ldb. 256  
*Scrophularia donetzica* Kotov 276  
*Scrophularia ebulifolia* M.B. 273  
*Scrophularia Ehrharti* Steven 270  
*Scrophularia exilis* Popl. 289  
*Scrophularia Fedtschenkoi* Gorschk. 293  
*Scrophularia fontana* Kotschy 259  
*Scrophularia frigida* Boiss. 281  
*Scrophularia frigida* Stiefelhag. 304  
*Scrophularia georgica* Benth. 356  
*Scrophularia Gmelini* Turcz. 307  
*Scrophularia Goldeana* Juz. 278  
*Scrophularia Gontscharovii* Gorschk. 295  
*Scrophularia grandidentata* Tenore 259  
*Scrophularia Grayana* Maxim. 271  
*Scrophularia Grossheimii* B. Schischk. 290



- Scrophularia haematantha* Boiss. et Heldr. 296, 297  
*Scrophularia haematantha* var. *crenata* Bordz. 296, 280  
*Scrophularia Halleri* Gueldenst. 269  
*Scrophularia heterophylla* auct. 279  
*Scrophularia heucheriflora* Schrenk 260  
*Scrophularia hyrcana* Grossh. 250  
*Scrophularia ilvensis* C. Koch 255  
*Scrophularia imeretica* Kem.-Nath. 279  
*Scrophularia incisa* Weinm. 307  
*Scrophularia incisa* var. *alpina* Kar et Kir. 306  
*Scrophularia incisa* var. *angustifolia* O. Fedtsch 307  
*Scrophularia incisa* var. *integra* Trautv. 308  
*Scrophularia incisa* var. *major* Ldb. 306  
*Scrophularia incisa* var. *pamirica* O. Fedtsch 307  
*Scrophularia incisa* var. *pinnata* Trautv. 307  
*Scrophularia incisa* var. *sublyrata* Kryl. et Serg. 308  
*Scrophularia incisa* f. *bidentata* Kryl. 308  
*Scrophularia incisa* f. *pauciflora* Kryl. 308  
*Scrophularia incisa* f. *procumbens* Kryl. 307  
*Scrophularia integrifolia* Pavl. 282  
*Scrophularia juncea* Richt. 291  
*Scrophularia kabadianensis* B. Fedtsch. 305  
*Scrophularia Kiriloviana* Schischk. 306  
*Scrophularia Kiriloviana* var. *subpinnata* Fisch. et Mey. 307  
*Scrophularia Kotschyana* Benth. 248  
*Scrophularia lateriflora* Trautv. 246  
*Scrophularia leucoclada* Bge. 297  
*Scrophularia Litwinowii* B. Fedtsch. 281  
*Scrophularia lucida* M. B. 285  
*Scrophularia lucida* Pall. 301  
*Scrophularia lunariifolia* Boiss. et Bal. 250  
*Scrophularia macrobotrys* Ldb. 266  
*Scrophularia mandshurica* Maxim. 262  
*Scrophularia marylandica* Georgi 261  
*Scrophularia Maximowiczii* Gorschk. 262  
*Scrophularia minima* M. B. 275  
*Scrophularia minima* Benth. 249  
*Scrophularia mollis* Somm. et Lev. 257  
*Scrophularia multicaulis* Turcz. 295  
*Scrophularia nachitschevanica* Grossh. 280  
*Scrophularia nervosa* Benth. 274  
*Scrophularia nervosa* var. *Schelkovnikovii* Bordz. 274  
*Scrophularia Nikitinii* Gorschk. 247  
*Scrophularia nodosa* L. 269  
*Scrophularia nodosa* Boiss. 266  
*Scrophularia nodosa* var. *glandulosa* Nas. 269  
*Scrophularia nudicaulis* Wydl. 172  
*Scrophularia Oldhami* Oliver 270  
*Scrophularia Olgae* Grossh. 286  
*Scrophularia Olivieri* Jaub. et Spach 274  
*Scrophularia olympica* Boiss. 288  
*Scrophularia olympica* var. *integrifolia* Bordz. 289  
*Scrophularia olympica* var. *pinnatifida* Trautv. 289  
*Scrophularia olympica* var. *platyloma* (Fisch. et Mey.) Grossh. 289  
*Scrophularia orientalis* L. 273  
*Scrophularia orientalis* var. *pinnatifolia* Bordz. 273  
*Scrophularia pamiro-alaica* Gorschk. 294  
*Scrophularia Patriniana* Wydl. 307  
*Scrophularia peregrina* L. 258  
*Scrophularia platyloma* Fisch. et Mey. 289  
*Scrophularia pinnata* Kar. et Kir. 306  
*Scrophularia pruinosa* Boiss. 300  
*Scrophularia pruinosa* auct. 290  
*Scrophularia pruinosa* Boiss. var. *dissecta* B. Fedtsch. 300  
*Scrophularia puberulla* Boiss. et Hausskn. 259  
*Scrophularia pumila* Adams 275  
*Scrophularia pyrrolopha* Boiss. 288  
*Scrophularia rostrata* Boiss. et Buhse 287  
*Scrophularia rosulata* Stiefelhag. 300  
*Scrophularia rupestris* M. B. 277, 278  
*Scrophularia rupestris* var. *microphylla* Somm. et Lev. 277  
*Scrophularia rupestris* auct. 276, 278  
*Scrophularia Ruprechtii* Boiss. 288  
*Scrophularia rutifolia* Boiss. 285  
*Scrophularia rutaefolia* Grossh. 286  
*Scrophularia sangtodensis* B. Fedtsch. 306

- Scrophularia sareptana* Kleop. 275  
*Scrophularia saxatilis* Boeb. 277  
*Scrophularia schugnanica* B. Fedtsch. 293  
*Scrophularia Scopolii* Hoppe 259  
*Scrophularia Scopolii* var. *adenocalyx* Somm. et Lev. 259  
*Scrophularia Scopolii* var. *glabrata* Trautv. 259  
*Scrophularia Scopolii* var. *grandicrenata* Somm. et Lev. 259  
*Scrophularia Scopolii grandidentata* (Ten.) Boiss. 259  
*Scrophularia Scorodonia* Host. 259  
*Scrophularia Sprengeriana* Somm. et Lev. 257  
*Scrophularia Stelleri* Ldb. 295  
*Scrophularia striata* Boiss. 291  
*Scrophularia tadshicorum* Gontsch. 247  
*Scrophularia thesioides* Boiss. et Buhse 303  
*Scrophularia turcomanica* Bornm. et Sint. 304  
*Scrophularia Urvilleana* Wydl. 302  
*Scrophularia Urvilleana* auct. 279  
*Scrophularia variegata* M. B. 302  
*Scrophularia variegata* var. *glabra* Gorschk. 302  
*Scrophularia variegata* var. *rupestris* Boiss. 277  
*Scrophularia vernalis* L. 251  
*Scrophularia vernalis* M.B. 249  
*Scrophularia vernalis* var. *hyrcana* Grossh. 250  
*Scrophularia vernalis* M. var. *lunariifolia* (Boiss. et Bal.) O. Ktze 250  
*Scrophularia verticillata* Gontsch. et Grig. 246  
*Scrophularia viscosa* Boiss. 248  
*Scrophularia xanthoglossa* Boiss. 291  
*Scrophularia xanthoglossa* var. *decipiens* (Boiss. et Kotschy) Boiss. 292  
*Scrophularia xanthoglossa* Stiefelhag. 303  
*Scrophularia zaravschanica* Gorschk. et Zakir. 293  
*Scrophularia zuvandica* Grossh. 299  
**Scrophulariaceae** Zindl., fam. 117  
*Semicalcaratae* Benth., sect. 568  
*Silvatica* Soo., subsect. 549  
*Singuliflora* Murb., sect. 155  
*Simiolus* Greene, sect. 312  
*Siphonantha* Bge., sect. 699  
*Siphonostegia* Benth. 795  
*Siphonostegia chinensis* Benth. 796  
**Solanaceae** Pers., fam. 1  
*Solaneae* Schlecht. 3  
*Solaninae* Wettst. 57  
*Solanineae* Dun. 3  
*Solanopsis* Börner 8, 42  
**Solanum** L. 3  
**Solanum alatum** Moench 33  
**Solanum asiae-mediae** Pojark. 21  
**Solanum bifurcum** Nochst. 11  
**Solanum citrullifolium** A. Br. 42  
**Solanum chlorocarpum** (Spenn.) Tausch 26  
**Solanum commutatum** Spreng. 45  
**Solanum decipiens** Opiz. 27  
**Solanum depilatum** Kitag. 17, 18  
**Solanum dulcamara** auct. 17  
**Solanum dulcamara** L. 12  
**Solanum dulcamara** var. *ovatum* auct. 17  
**Solanum dulcamara** var. *persicum* Dippel 15  
**Solanum dulcomara** var. *persicum* O. Ktze. 19  
**Solanum dulcomara** var. *persicum* Trautv. 17  
**Solanum dulcomara** var. *tomentosum* Koch 16  
**Solanum dulcomara** var. *villosissimum* Desv. 16  
**Solanum dulcomara**  $\beta$ . *indivisum* Boiss. 15, 18, 19  
**Solanum dulcomara**  $\beta$ . *litorale* Rchb. 16  
**Solanum dulcomara**  $\gamma$ . *macrocarpum* Maxim. 20  
**Solanum dulcomara**  $\gamma$ . *marinum* Bab. 16  
**Solanum esculentum** Dun. 39  
**Solanum flavum** auct. 30, 35  
**Solanum flavum** Schult. 29, 30, 3  
**Solanum foliosum** Link 50  
**Solanum heterodoxum** Dun. 42  
**Solanum Humboldtii** Willd. 49, 50  
**Solanum humile** Bernh. 26  
**Solanum japonense** Nakai 12  
**Solanum judaicum** Bess. 28  
**Solanum Kieseritzkii** C. A. M. 10  
**Solanum Kitaibelii** Schult. 35  
**Solanum litorale** Raab 16

- Solanum luridum* Salisb. 50  
*Solanum luteo-virens* C. C. Gmel. 26  
*Solanum luteum* Mill. 36  
*Solanum lycopersicum* auct. 52, 54  
*Solanum lycopersicum* L.  $\beta$ . 50, 52, 54  
*Solanum lycopersicum* L. excl. var. 55  
*Solanum lyratum* Thunb. 12, 22  
*Solanum macrocarpum* Koidz. 20  
*Solanum macrocarpum* Kudo 20  
*Solanum marinum* (Bab.) Pojark. 16  
*Solanum megacarpum* Koidz. 20  
*Solanum melanocerasum* auct. 25  
*Solanum melongena* L. 39  
*Solanum miniatum* auct. 32  
*Solanum miniatum* Bernh. 33  
*Solanum miniatum*  $\beta$ . *glabriusculum* Zelenetzk. 32  
*Solanum nigrum* L. 25  
*Solanum nigrum* auct. 27, 30  
*Solanum nigrum* var. *flavum* auct. 30, 35  
*Solanum nigrum* var. *flavum* Hohenack. 29  
*Solanum nigrum* var. *genuinum* Döll. 28  
*Solanum nigrum* var. *judaicum* L. 29  
*Solanum nigrum* var. *miniatum* Mert. et Koch 33  
*Solanum nigrum* var. *Schultesii* (Opiz) Rouy 28  
*Solanum nigrum* var. *villosum* auct. 30  
*Solanum nigrum* var. *vulgare* L. 25, 28  
*Solanum nigrum* var. *xanthocarpum* auct. 29  
*Solanum nigrum*  $\beta$ . *villosum* auct. 32  
*Solanum nigrum*  $\gamma$ . *villosum* L. 36  
*Solanum nipponense* Makino 12  
*Solanum nipponense* var. *macrocarpum* Makino et Nemoto 20  
*Solanum ochroleucum* Bast. 29, 30  
*Solanum Olgae* Pojark. 30  
*Solanum persicum* auct. 17  
*Solanum persicum* Willd. 19  
*Solanum persicum* var. *assimile* Grossh. 19  
*Solanum peruvianum* L. 45  
*Solanum pimpinellifolium* Jusl. 47  
*Solanum pomiferum* Cav. 52, 54  
*Solanum pseudoflavum* Pojark. 35  
*Solanum pseudolycopersicum* Jacq. 52, 54  
*Solanum pseudopersicum* Pojark. 18  
*Solanum puniceum* C. C. Gmel. 33  
*Solanum quercifolium* L. 11  
*Solanum radicans* L. fil. 11  
*Solanum rostratum* Dun. 41  
*Solanum rubrum* Gilib. 33  
*Solanum scandens* auct. 15  
*Solanum Schultesii* Opiz 27, 28  
*Solanum septemlobum* Bge. 11  
*Solanum sisymbriifolium* Lam. 42  
*Solanum spurium* Gmel. 52, 54  
*Solanum transcaasicum* Pojark. 29  
*Solanum tuberosum* L. 8  
*Solanum villosum* auct. 32  
*Solanum villosum* Lam. 36  
*Solanum villosum* var. *alatum* auct. 33, 34  
*Solanum viridescens* Kostel. 26  
*Solanum Woronowii* Pojark. 34  
*Solanum Zelenetzkii* Pojark. 32  
*Solanum* sect. *Nycterium* Wettst. 41  
*Solanum* sect. *Cryptocarpum* Dun. 40  
*Speciosae* (Benth.) Wettst., sect. 187  
*Spicata* (Wettst.) Soo, sect. 536  
*Spirostegia* Ivanina 512, 816  
*Spirostegia bucharica* (Fedtsch.) Ivanina 513  
*Staurophragma* Fisch. et Mey. 174  
*Staurophragma natolicum* Fisch. et Mey. 174  
*Stenocarpon* Boriss., sect. 809, 488  
*Stramonium fastuosum* fl. albo Moench 112  
*Stramonium foetidum* Scop. 109  
*Stramonium spinosum* Lam. 109  
*Stramonium tatula* Moench 111  
*Stramonium vulgatum* Gaertn. 109  
*Tittmannia obovata* Bge. 316  
*Tittmannia stachydifolia* Turcz. 317  
*Tomiohyllum* Fourr. 229  
*Tomiohyllum caninum* Fourr. 301  
*Tomiohyllum tenuisectum* Fourr. 301  
*Tomiohyllum Benth*, sect. 273  
*Tozzia* L. 552  
*Tozzia alpina* auct. 552  
*Tozzia carpatica* Woloszcz. 552  
*Triaenophora bucharica* B. Fedtsch. 513  
*Trixago Apula* Stev. 659  
*Trixago latifolia* Rchb. 642  
*Trixago purpurea* Stev. 642  
*Trixago viscosa* Rchb. 646  
*Tuberarium* (Dun.) Bitter, sect. 8



Tuberarium Potatœ Dun., subsect. 8  
Tuberculatæ Kuprian., subsect. 194

**Vandellia** L. 326

**Vandellia diffusa** L. 326

**Vandellia diffusa** a. pedunculata Benth.  
327

**Vandellia obovata** Walp. 316

**Vandellia Pyxidaria** Maxim. 328

**Vandellia stachydifolia** Walp. 317

**Venilia** Fourr. 229

**Venilia vernalis** Fourr. 251

Verbasceæ Benth. 122

**Verbascum** L. 122

**Verbascum achalkalakense** Bordz. 149

**Verbascum Alopecurus** Thuill. 149, 150

**Verbascum alpigenum** C. Koch 154

**Verbascum arpatzaicum** Bordz. 125

**Verbascum atroviolaceum** Murb. 168

**Verbascum artvinense** Wulff 138

**Verbascum aureum** O. Kuntze 163

**Verbascum australe** Pavl. 160

**Verbascum bactrianum** Bge. 132

**Verbascum bactrianum** × songoricum  
133

**Verbascum Balansæ** Bornm. 142

**Verbascum banaticum** Roch. 134

**Verbascum Biebersteinii** Bess. 142

**Verbascum blattaria** L. 167, 169

**Verbascum blattaria** var. *brevipedicellatum* Hal. 167

**Verbascum candelabrum** Kar. et Kir.  
169

**Verbascum Capusi** Franch. 132

**Verbascum caucasicum** Bornm. 169

**Verbascum caucasicum** Fisch. 148

**Verbascum cedreti** Boiss. 152

**Verbascum Chaixii** Ldb. 147

**Verbascum Chaixii** var. *orientale* Murb.  
147

**Verbascum Chaixii** var. *polyphyllum* 148

**Verbascum Chaixii** var. *polyphyllum* ×  
*phoeniceum* 149

**Verbascum Chaixii** var. *polyphyllum* ×  
*pyramidatum* 149

**Verbascum cheiranthifolium** Boiss. 136

**Verbascum cheiranthifolium** ×  
songoricum 137

**Verbascum cheiranthifolium** var. *transcaspicum* Murb. 137

**Verbascum claudiopolitanum** Simk. 143

**Verbascum collinum** Schrad. 150

**Verbascum compactum** M. B. 156

**Verbascum crenatifolium** Boiss. 156

**Verbascum cuspidatum** Schrad. 126

**Verbascum daenense** Boiss. 133

**Verbascum Dechianum** Somm. et Lev.  
115

**Verbascum eriocarpum** Freyn et Sint.  
169

**Verbascum eriorhabdon** Boiss. 141

**Verbascum eriorhabdon** var. *Balansæ*  
(Bornm.) Murb. 142

**Verbascum erivanicum** Wulff 152

**Verbascum flavidum** (Boiss.) Freyn et  
Bornm. 170

**Verbascum flexuosum** Wulff 147

**Verbascum formosum** Fisch. 157

**Verbascum formosum** × *pyramidatum*  
158

**Verbascum georgicum** Benth. 124, 125

**Verbascum georgicum** × *hajastanicum*  
125

**Verbascum georgicum** × *songoricum*  
125

**Verbascum georgicum** × *speciosum* 125

**Verbascum georgicum** × *varians* 125

**Verbascum glomeratum** Boiss. 131

**Verbascum gnaphalodes** M. B. 140

**Verbascum gnaphalodes** × *phlomoïdes*  
141

**Verbascum gossypinum** M. B. 145

**Verbascum hajastanicum** Bordz. 145

**Verbascum hajastanicum** × *georgicum*  
146

**Verbascum hajastanicum** × *phoeniceum*  
146

**Verbascum hajastanicum** × *sceptrum* Oliv.  
125, 146

**Verbascum Heldreichii** Boiss. 134

**Verbascum heterophyllum** O. Kuntze 171

**Verbascum Hohenackeri** Fisch. et Mey.  
145

**Verbascum Holmbergii** Murb. 154

**Verbascum Johannis** Murb. 163

**Verbascum khorassanicum** Boiss. 133

**Verbascum laxum** Filar. 148

**Verbascum laxum** × *phoeniceum* 148,  
149

**Verbascum laxum** × *pyramidatum* 149

**Verbascum laxum** × *Wilhelmsonianum*  
148, 149, 151

- Verbascum longifolium* Ldb. 135  
*Verbascum lychnitis* L. 142  
*Verbascum lychnitis* × *nigrum* 143  
*Verbascum lychnitis* × *phoeniceum* 143  
*Verbascum lychnitis* × *phlomoides* 128, 143  
*Verbascum lychnitis* × *pyramidatum* 143  
*Verbascum lychnitis* × *thapsus* 143  
*Verbascum macrocarpum* Boiss. 164  
*Verbascum macrophyllum* Boiss. et Buhse 139  
*Verbascum megalophyllum* (Boiss. et Heldr.) Hal. 135, 136  
*Verbascum molle* C. Koch 158  
*Verbascum nigrum* L. 149  
*Verbascum nigrum* × *phoeniceum* 150  
*Verbascum nigrum* × *thapsus* 150  
*Verbascum nigrum* var. *glabrescens* Hartm. 150  
*Verbascum nigrum* var. *tomentosum* G. Mey. 150  
*Verbascum oreophilum* C. Koch 163  
*Verbascum orientale* M. B. 147, 148, 151  
*Verbascum orientale* × *phoeniceum* 148, 149  
*Verbascum orientale* × *Wilhelmsianum* 148, 151  
*Verbascum orientale* var. *parviflorum* Wulff 148  
*Verbascum orientale* β. *polyphyllum* C. A. M. 148  
*Verbascum orientale* O. Kuntze 171  
*Verbascum ovalifolium* Don 156  
*Verbascum ovalifolium* × *phoeniceum* 149  
*Verbascum ovalifolium* × *pyramidatum* Troitzky 158  
*Verbascum ovalifolium* Ldb. 157  
*Verbascum paniculatum* Wulff 153  
*Verbascum phlomoides* L. 123, 127, 134  
*Verbascum phlomoides* × *speciosum* 141  
*Verbascum phoeniceum* L. 168, 169  
*Verbascum phoeniceum* × *pyramidatum* 169  
*Verbascum phoeniceum* × *songoricum* 169  
*Verbascum phoeniceum* × *spectabile* 169  
*Verbascum phoeniceum* ssp. *flavidum* Bornm. 170  
*Verbascum phoeniceum* var. *chloranthum* Boiss. et Buhse 170  
*Verbascum phoeniceum* β. *flavidum* Boiss. 170  
*Verbascum pinnatifidum* Vahl 137  
*Verbascum polystachyum* Kar. et Kir. 133, 134  
*Verbascum ponticum* Fisch. et Mey. 125  
*Verbascum pulverulentum* M. B. 142  
*Verbascum punalense* Boiss. et Buhse 161, 162  
*Verbascum pyramidatum* M. B. 162  
*Verbascum pyramidatum* × *songoricum* 163  
*Verbascum pyramidatum* × *thapsus* 163  
*Verbascum Roopianum* Bordz. 146  
*Verbascum saccatum* C. Koch 158  
*Verbascum samoneum* Troitzky 158  
*Verbascum seeptrum* Schmalh. 124, 125  
*Verbascum seeptrum* × *speciosum* (?) 125  
*Verbascum seeptrum* × *songoricum* Murb. 125  
*Verbascum Schraderi* G. F. W. Mey. 128  
*Verbascum sessiliflorum* Murb. 125  
*Verbascum sinaiticum* Murb. 132  
*Verbascum sinaiticum* var. *bactrianum* 132  
*Verbascum sinuatum* L. 144  
*Verbascum sinuatum* × *songoricum* 145  
*Verbascum sinuatum* var. *adenosepalum* Murb. 144  
*Verbascum songoricum* Schrenk 133, 124  
*Verbascum speciosum* Schrad. 135  
*Verbascum speciosum* var. *megaphyllum* Boiss. et Heldr. 135  
*Verbascum spectabile* M. B. 162, 169  
*Verbascum spectabile* β. *foliosum* C. Koch 168  
*Verbascum stachydifforme* Boiss. et Buhse 139  
*Verbascum Stevenii* Boiss. 158  
*Verbascum Szovitsianum* Boiss. 151  
*Verbascum Szovitsianum* var. *adenothyrsus* Murb. 151  
*Verbascum talyschense* Boiss. et Buhse 139  
*Verbascum tauricum* Hook. 169  
*Verbascum thapsiforme* Schrad. 124, 126  
*Verbascum thapsiforme* × *lychnitis* 128  
*Verbascum thapsus* L. 128, 124, 127  
*Verbascum thapsus* × *gnaphalodes* 141

- Verbascum transcaasicum* Wulff 154  
*Verbascum turkestanicum* Franch. 140  
*Verbascum turcomanicum* Murb. 143  
*Verbascum undulatum* M. B. 144  
*Verbascum varians* Freyn et Sint. 146  
*Verbascum varians*  $\beta$ . *flexiosum* Murb. 147  
*Verbascum viminale* Guss. 125  
*Verbascum vimineum* Cyr. 125  
*Verbascum Wilhelmsianum* C. Koch 150, 148, 149  
*Verbascum* sp. nov. Hohen. 148  
*Vernales* Stiefelhag., subsect. 246  
*Veronica* L. 329  
*Veronica acinifolia* L. 429  
*Veronica acinifolia* Römpf 425  
*Veronica acinifolia* Schmalh. 420  
*Veronica acinifolia* var. *glabrata* Trautv. 425, 426  
*Veronica acinifolia* var. *Karelini* Trautv. 425  
*Veronica acinifolia* var. *nudicaulis* (Kar. et Kir.) Römpf 425  
*Veronica acinifolia* var. *typica* Trautv. 429  
*Veronica acutifolia* Gilib. 469  
*Veronica acutifolia* Javorka 473  
*Veronica agrestis* auct. 409  
*Veronica agrestis* L. 408  
*Veronica agrestis* Ldb. 410  
*Veronica agrestis* var. *minima* O. Ktze. 410  
*Veronica agrestis*  $\beta$ . *polita* (Fries) Koch 409  
*Veronica alata* M. Pop. 385  
*Veronica albenica* Boiss. 407  
*Veronica albanica* C. Koch 397  
*Veronica algida* Fisch. 363  
*Veronica alpestris* Schur. 365  
*Veronica alpina* auct. 490  
*Veronica alpina* L. 481  
*Veronica alpina* Pall. 486  
*Veronica altaica* Fisch. 436  
*Veronica ambigua* Lucé 469  
*Veronica americana* (Rafin.) Schweinitz 477  
*Veronica amoena* Boiss. 397  
*Veronica amoena* Stev. 407  
*Veronica anagallidiformis* Boreau 473  
*Veronica anagallis* auct. 469  
*Veronica anagallis* C. A. M. 470  
*Veronica anagallis* Ldb. 477  
*Veronica anagallis* var. *anagalloides* (Guss.) C. Koch 470  
*Veronica anagallis* var. *macra* Trautv. 478  
*Veronica anagallis* var. *umbrosa* Koschewn. 475  
*Veronica anagallis*  $\beta$ . *aquatica* Neill. 469  
*Veronica anagallis*  $\beta$ . *villosa* Bge. 475  
*Veronica anagallis-aquatica* L. 469, 470, 477  
*Veronica anagallis-aquatica* var. *montioides* Boiss. 478  
*Veronica anagalloides* Guss. 470  
*Veronica anagalloides* Römpf 475  
*Veronica anagalloides* var. *maruensis* B. Fedtsch. 480  
*Veronica anagalloides*  $\beta$ . *tenuis* Boiss. 470  
*Veronica Andrashovskiyi* Jav. 383  
*Veronica angustifolia* Fisch. 386  
*Veronica anisophylla* C. Koch 434  
*Veronica aphylla* Georgi 452  
*Veronica aphylla* L. 451  
*Veronica aphylla* var. *kamtschatica* Willd. 452  
*Veronica aphylla*  $\beta$ . *grandiflora* Benth. 452  
*Veronica aphylla*  $\beta$ . Willd. 452  
*Veronica aquatica* Bernh. 473  
*Veronica arceutobia* Woron. 439  
*Veronica arenosa* (Serg.) Boriss. 390  
*Veronica argute-serrata* Rgl. et Schmalh. 394  
*Veronica armena* Boiss. 467  
*Veronica arvensis* L. 418  
*Veronica australis* Schrad. 381  
*Veronica austriaca* Bge. 437  
*Veronica austriaca* L. 435, 438  
*Veronica austriaca*  $\times$  *V. latifolia* Kusnez. 435  
*Veronica austriaca* ssp. *dentata* (Schmidt) Watzl 435  
*Veronica austriaca* ssp. *Jacquini* (Baumg.) Maly 438  
*Veronica austriaca* ssp. *Jacquini* Baumg. var. *bipinnatifida* C. Koch 439  
*Veronica austriaca* L.  $\alpha$ . *dentata* Koch 435, 437



- Veronica austriaca*  $\alpha$ . *prostrata* Kauffm. 437  
*Veronica austriaca*  $\beta$ . *orientalis* C. Koch 440  
*Veronica austriaca*  $\beta$ . *pinnatifida* C. Koch 438  
*Veronica austriaca*  $\gamma$ . *bipinnatifida* Ldb. 445  
*Veronica austriaca*  $\gamma$ . *tenuifolia* C. Koch 445  
*Veronica austriaca*  $\delta$ . *multifida* Pall. 445  
*Veronica* Bachofenii Heuff. 369  
*Veronica* Baranetzki Bordz. 465  
*Veronica* Barrelieri Schult. 383  
*Veronica bartsiaefolia* Boiss. 395  
*Veronica Baumgartenii* Roem. et Schult. 491  
*Veronica beccabunga* L. 475, 477  
*Veronica beccabunga procumbens* Rafin. 477  
*Veronica beccabunga* var. *americana* Rafin. 477  
*Veronica beccabunga* var. *americana* (Schwein.) Glehn 477  
*Veronica beccabunga* var. *muscosa* (Korsch.) O. et B. Fedtsch. 477  
*Veronica beccabunga* var. *tenerrima* (F. W. Schmidt) Kryl. 475  
*Veronica beccabungoides* Bornm. 478  
*Veronica bellidifolia* Juz. 379, 380  
*Veronica bellidioides* L. 482  
*Veronica biloba* auct. 397  
*Veronica biloba* L. 392  
*Veronica biloba* ssp. *Bornmülleri* (Hausskn.) Wulff 395  
*Veronica biloba* var. *dasycarpa* var. Trautv. 397  
*Veronica biloba* var. *glandulissima* Bornm. 395  
*Veronica biloba* var. *minima* C. Koch 426  
*Veronica biloba* var. *platysepala* Trautv. 392  
*Veronica Benthani* C. Koch 463  
*Veronica Biebersteinii* C. Richter 445  
*Veronica Billardieri* Vahl 440  
*Veronica biserrata* Schur 369  
*Veronica Bobrovii* Nevski 479  
*Veronica borealis* Laest. 363  
*Veronica Bordzilovskii* Juz. 443  
*Veronica* Bornmülleri Hausskn. 334, 395  
*Veronica brevifolia* M. B. 376  
*Veronica brevipedunculata* Gilib. 418  
*Veronica bucharica* B. Fedtsch. 399  
*Veronica Buxbaumiana* Pall. 356  
*Veronica Buxbaumii* Ten. 411  
*Veronica callitrichoides* Kom. 454  
*Veronica Calverti* Boiss. 461  
*Veronica campestris* Schmalh. 420  
*Veronica campylopoda* Boiss. 397  
*Veronica campylopoda* Römpf 394  
*Veronica camtschatica* Greml. 452  
*Veronica canescens* C. Koch 439  
*Veronica canescens* Schrad. 378  
*Veronica capillipes* Nevski 399, 400  
*Veronica capillipes* Grig. 398  
*Veronica capitata* Fisch. 486  
*Veronica capitata* var. *tomentosa* Schmidt 485  
*Veronica cardiocarpa* (Kar. et Kir.) Walpers 404  
*Veronica cardiocarpa* Wulff 404  
*Veronica cartilaginea* Ldb. 386  
*Veronica caucasica* M. B. 439  
*Veronica cerasifolia* Monjuschko 499  
*Veronica ceratocarpa* C. A. M. 424  
*Veronica ciliata* Fisch. 490  
*Veronica ciliata* auct. 491  
*Veronica chamaedrys* L. 430  
*Veronica chamaedrys* L.  $\alpha$ . *legitima* Ldb. 431  
*Veronica chamaedrys*  $\beta$ . *peduncularis* Ldb. 433, 463  
*Veronica chamaedrys*  $\beta$ . *pilosa* Benth. 431  
*Veronica chantavica* Pavl. 393  
*Veronica chantavica* var. *hirtella* Pavl. 394  
*Veronica* Charadzeae Kem.-Nath. 356, 361  
*Veronica collina* Opiz 405  
*Veronica comosa* Richter 469, 473  
*Veronica coniosperma* Wallr. 429  
*Veronica crista-galli* Stev. 413  
*Veronica cristata* Bernh. 384  
*Veronica cuspidata* Gilib. 368  
*Veronica cymbalaria* Bod. 417  
*Veronica cymbalariaefolia* Vahl. 417  
*Veronica cymbalarifolia* M. B. 417  
*Veronica Czerniakowskiana* Monjuschko 446, 448  
*Veronica daghestanica* Trautv. 493

- Veronica dahurica* Stev. 372, 379  
*Veronica densiflora* Ldb. 486  
*Veronica dentata* Schmidt 435  
*Veronica denudata* Alboff 44  
*Veronica depauperata* Waldst. et Kit. . 451  
*Veronica didyma* Ten. 409  
*Veronica didyma* Spreng. 408  
*Veronica Dillenii* Crantz 420  
*Veronica dissecta* Somm. et Lev. 463  
*Veronica elatior* M. B. 368  
*Veronica elbursensis* Boiss. 392  
*Veronica euphrasiaefolia* Stroh 459  
*Veronica euphrasiaefolia* var. *glareosa*  
(Somm. et Lev.) Stroh 459  
*Veronica euphrasiaefolia* Link var. *liwa-*  
*nensis* (C. Koch)  
Stroh 461  
*Veronica euxina* Turill 382  
*Veronica Fedtschenkoi* Boriss. 491  
*Veronica ferganica* M. Pop. 396  
*Veronica filifolia* Lipsky 445  
*Veronica filiformis* auct. 411  
*Veronica filiformis* Smith 423  
*Veronica filiformis* var. *subabortiva*  
Reynier 423  
*Veronica filiformis*  $\beta$ . *macrantha* Bordz.  
423  
*Veronica foliosa* Waldst. et Kit. 376  
*Veronica fontana* Pall. 365, 366  
*Veronica fruticans* Jacq. 484  
*Veronica fruticulosa* L. 485  
*Veronica gadensis* Güld. 499  
*Veronica galactites* Hance 386  
*Veronica galathica* Boiss. 450  
*Veronica galeopsifolia* Gilib. 381  
*Veronica gaudanensis* B. Fedtsch. 404  
*Veronica gentianoides* Vahl. 356  
*Veronica gentianoides* var. *latifolia* Boiss.  
357  
*Veronica gentianoides* var. *pyncnophylla*  
Bordz. 357  
*Veronica glabrifolia* Boriss. 461  
*Veronica glareosa* Somm. et Lev. 459  
*Veronica Gorbunovii* Gontsch 489  
*Veronica gorumensis* Boiss. et Kotschy  
429  
*Veronica gracilis* Uechtr. 474  
*Veronica grandiflora* Gaertn. 452  
*Veronica grandiflora* var. *latifolia* Hult.  
453  
*Veronica grandis* Fisch. 372  
*Veronica grandis* Römpf 370  
*Veronica Grayi* Miyabe et Kudo 371  
*Veronica Griffithii* Benth. 404  
*Veronica hederifolia* L. 414  
*Veronica hederifolia* Miq. 409  
*Veronica hederifolia* triloba Opiz 414  
*Veronica hederifolia* var. *triloba* (Opiz)  
Beck 414  
*Veronica heterophyllos* Böber 500  
*Veronica hirsuta* Lucé 418  
*Veronica hispidula* Boiss. et Huet 426  
*Veronica Hjuleri* Pauls. 475  
*Veronica hololeuca* Juz. 380  
*Veronica humifusa* Dickson 366  
*Veronica hybrida* Georgi 368  
*Veronica hybrida* L. 381  
*Veronica hybrida* M. B. 383  
*Veronica imeretica* Kem.-Nath. 356, 358  
*Veronica incana* L. 377, 379, 380  
*Veronica incana* Turcz. 379  
*Veronica incana*  $\times$  *V. spicata* 379  
*Veronica incana* var. *canescens* Schrad.  
378  
*Veronica incana* b. *neglecta* (Vahl)  
Schmalh. 378  
*Veronica incisa* Schrad. 386  
*Veronica incisa* Soland. 391  
*Veronica incisa* Bordz. 463  
*Veronica intercedens* Bornm. 404  
*Veronica ivaefolia* Pall. 357  
*Veronica ivoides* Juz. 356, 357  
*Veronica ixodes* Boiss. et Bal. 426  
*Veronica japonica* Sieb. et Zucc. 495  
*Veronica karatavica* Pavl. 395  
*Veronica karataviensis* Pavl. 395  
*Veronica Kemulariae* Kuthath. 356, 358  
*Veronica khorossanica* Czernjak 447–449  
*Veronica Komarovii* Monjuschko 377  
*Veronica Komarovii* f. *albiflora* Hara 377  
*Veronica kopetdagensis* B. Fedtsch. 460  
*Veronica Krylovii* Pavl. 382  
*Veronica Krylovii* Schischk. 436  
*Veronica kurdica* Benth. 443  
*Veronica laeta* Kar. et Kir. 389  
*Veronica laeta* Kar. et Kir. var. *arenosa*  
Serg. 390  
*Veronica latifolia* L. 434, 435  
*Veronica latifolia* Lam. 456  
*Veronica latifolia*  $\beta$ . *major* C. Koch 434  
*Veronica latifolia*  $\beta$ . *minor* Ldb. 436  
*Veronica latifolia*  $\gamma$ . *minor* C. Koch 434

- Veronica latifolia*  $\delta$ . *caule stricto* C. Koch 434  
*Veronica lcucantha* Helm 376  
*Veronica lilacina* Towns. 482  
*Veronica linariifolia* Pall. 386  
*Veronica linariifolia* var. *baicalensis* Boriss. 389  
*Veronica liwanensis* C. Koch. 461  
*Veronica liwanensis* Römpp 459  
*Veronica longebracteata* Link 381  
*Veronica longiflora* Roem. et Schult. 494  
*Veronica longifolia* L. 367, 385  
*Veronica longifolia* Ldb. 372  
*Veronica longifolia* L. var. *borealis* Trautv. 369  
*Veronica longifolia* var. *grandis* (Fisch.) Turcz. 372  
*Veronica longifolia* var. *Grayi* Fr. Schmidt 371  
*Veronica longifolia* var. *japonica* Maxim. 371  
*Veronica longifolia* var. *maritima* (L.) Syreitsch. 368, 369  
*Veronica longifolia* var. *subsessilis* Miq. 371  
*Veronica longifolia*  $\beta$ . *puberula* Benth. 368  
*Veronica longifolia*  $\beta$ . et  $\gamma$ . C. Koch. 367  
*Veronica longipedunculata* Gilib. 409  
*Veronica Lütkeana* Rupr. 485  
*Veronica luxurians* Ldb. 368  
*Veronica lysimachioides* Boiss. 480  
*Veronica macrocarpa* Turcz. 490  
*Veronica macrostemon* auct. 485, 487  
*Veronica macrostemon* Bge. 485  
*Veronica macrostemonoides* Zak. 487  
*Veronica maritima* L. 368, 369  
*Veronica maruensis* B. Fedtsch. 487  
*Veronica maxima* Mill. 368, 369  
*Veronica maxima* Stev. 480  
*Veronica maxima* Mill. var. *uralensis* Boriss. 456  
*Veronica maxima*  $\beta$ . *stricta* C. Koch 432  
*Veronica media* Baumg. 369  
*Veronica media* Schrad. 368  
*Veronica melissaefolia*  $\beta$ . *maxima* Benth. 432  
*Veronica melissifolia* Desf. 432  
*Veronica menthaefolia* Schott 381  
*Veronica meskhetica* Kem.-Nath. 411  
*Veronica Michauxii* B. Fedtsch. 480  
*Veronica Michauxii* Lam. 479  
*Veronica micrantha* Schur. 418  
*Veronica microcarpa* Boiss. 352, 467  
*Veronica microphylla* Kit. 365  
*Veronica microtheca* Boiss. et Bal. 398  
*Veronica minima* C. Koch 426  
*Veronica minuta* C. A. M. 459  
*Veronica Miyabei* Nakai. 371  
*Veronica mogoltavica* M. Pop. 404  
*Veronica montana* auct. 433  
*Veronica montana* L. 455  
*Veronica montana* Pall. 435  
*Veronica monticola* Trautv. 362  
*Veronica montioides* Boiss. 478  
*Veronica mthiuletica* Kem.-Nath. 464  
*Veronica multifida* Georgi 500  
*Veronica multifida* Jacq. 438  
*Veronica multifida* L. 444  
*Veronica multifida* var. *tenuifolia* Boiss. 445  
*Veronica multispicata* Güld. 500  
*Veronica muscosa* Korsh. 475  
*Veronica neglecta* Vahl. 378  
*Veronica neglecta* F.W. Schmidt 365  
*Veronica nemorum* Pall. 463  
*Veronica Nevskii* Boriss. 396  
*Veronica nigricans* C. Koch 433  
*Veronica nitens* Host 381  
*Veronica nudicaulis* Kar. et Kir. 425  
*Veronica nudicaulis* var. *glabrata* Kryl. 425  
*Veronica nudicaulis* var. *eglandulosa* Ldb. 426  
*Veronica nutans* Bong. 481  
*Veronica officinalis* L. 351, 449  
*Veronica olgensis* Kom. 370  
*Veronica oltensis* Woron. 466  
*Veronica opaca* B. Fedtsch. 409, 410  
*Veronica opaca* Fries 410  
*Veronica oppositifolia* Gilib. 381  
*Veronica orbicularis* Fisch. 459  
*Veronica orchidea* Crantz 384  
*Veronica orchidea* Crantz var. *Buschii* (N. Kusnez.) Troitzky 384  
*Veronica orientalis* auct. 443  
*Veronica orientalis* Mill. 440  
*Veronica orientalis* var. *dissecta* Trautv. 444  
*Veronica orientalis* var. *tenuifolia* Boiss. 443



- Veronica orientalis*  $\beta$ . *humilis angustifolia* M. B. 440  
*Veronica orientalis*  $\beta$ . *taurica* Vahl 443  
*Veronica osiliensis* Lucé 469  
*Veronica ossetica* Stev. 439  
*Veronica oxycarpa* auct. 480  
*Veronica oxycarpa* Boiss. 480  
*Veronica oxycarpa* var. *turcmenica* Schlenker 480  
*Veronica oxyphylla* Stev. 368  
*Veronica pallens* Host 378  
*Veronica pallida* Hornem. 356  
*Veronica paniculata* L. 376  
*Veronica paniculata* Miq. 386  
*Veronica paniculata* Pall. 376  
*Veronica paniculata*  $\beta$ . *angustifolia* Benth. 386  
*Veronica parviflora* Vahl. 440  
*Veronica pauciflora* Kit. 451  
*Veronica pectinata* Georgi. 440  
*Veronica peduncularis* auct. 433  
*Veronica peduncularis* M. B. 433, 462  
*Veronica peduncularis* M. B. var. *dissecta* ~~Somm.~~ et Lev. 463  
*Veronica peduncularis* M. B. var. *genuina* Trautv. 463  
*Veronica peduncularis* var. *umbrosa* (M. B.) Boiss. 433  
*Veronica peduncularis*  $\gamma$ . *petraea* M. B. 464  
*Veronica peregrina* L. 420  
*Veronica perpusilla* Boiss. 425  
*Veronica perpusilla* Nevski 396  
*Veronica persica* Poir. 411  
*Veronica persicifolia* Schott. 368  
*Veronica petraea* Baumg. 451  
*Veronica petraea* (M. B.) Stev. 462, 464, 465  
*Veronica petraea* Römpf 444, 465  
*Veronica petraea* ssp. *Baranetskii* (Bordz.) Wulff 465  
*Veronica petraea* var. *glabriuscula* Wulff 461  
*Veronica petraea* var. *integerrima* Trautv. 465  
*Veronica petraea* var. *microphylla* Trautv. 464  
*Veronica petraea* var. *typica* Trautv. 464  
*Veronica pilosa* L. 431  
*Veronica pinnata* L. 392  
*Veronica pinnata* var. *sessiliflora* (Bge.) Härle 391  
*Veronica pinnatifida* Salisb. 391  
*Veronica phoenicantha* C. Koch 463  
*Veronica polita* Fries 409  
*Veronica poljensis* Murbeck 475  
*Veronica pontica* Bornm. 356  
*Veronica pontica* (Rupr.) Wettst. 492  
*Veronica pontica* var. *glabra* (Somm. et Lev.) Stroh 493  
*Veronica Porphyriana* Pavl. 382  
*Veronica praecox* All. 406  
*Veronica propinqua* Boriss. 462, 464  
*Veronica prostrata* L. 437  
*Veronica prostrata* c. *angustifolia* Benth. 435  
*Veronica pseudochamaedrys* Jacq. 434  
*Veronica pseudolongifolia* Printz 368  
*Veronica psilophylla* Nevski. 381  
*Veronica pusilla* Benth. 469, 478  
*Veronica pycnophylla* Bordz. 357  
*Veronica quinquefida* Gilib. 405  
*Veronica quinquefolia* Gilib. 405  
*Veronica ramosissima* Boriss. 398  
*Veronica recta* Benth. 438  
*Veronica repens* Clarion. 459  
*Veronica repens* Gilib. 449  
*Veronica reticulata* C. Koch 424  
*Veronica Riederiana* Gandoger 343, 367  
*Veronica romana* Georgi 429  
*Veronica romana* L. 420  
*Veronica rotundifolia* Lucé 365  
*Veronica rotundifolia erecta* Gilib. 476  
*Veronica rotundifolia repens* Gilib. 476  
*Veronica rubella* Pall. 386  
*Veronica rubicunda* Ldb. 386  
*Veronica rubrifolia* Boiss. 396  
*Veronica ruderalis* Vahl. 365  
*Veronica rupestris* Tardent 499  
*Veronica Ruprechtii* Lipsky 492  
*Veronica ruthenica* Fisch. 376  
*Veronica ruthenica* Hort. 368  
*Veronica sachalinensis* Boriss. 337, 496  
*Veronica sajanensis* Printz. 375  
*Veronica saxatilis* L. f. 484  
*Veronica scardica* Griseb. 474  
*Veronica schistosa* E. Busch 362  
*Veronica Schmidiana* Rgl. 364  
*Veronica Schmidiana* var. *albiflora* Sugawara 364

- Veronica Schmidiana* var. *rubescens* Sugawara 364  
*Veronica scutellata* L. 453  
*Veronica scutellata* var. *glandulosa* Wulff 454  
*Veronica scutellata* var. *pubescens* Schmalh. 453  
*Veronica scutellata* var. *Teplouchowi* Korsch. 453, 454  
*Veronica scutellata*  $\beta$ . *pilosa* Vahl. 453, 454  
*Veronica secundiflora* C. Koch 463  
*Veronica septentrionalis* Boriss. 369  
*Veronica serpyllifolia* L. 365, 366  
*Veronica serpyllifolia* auct. 366  
*Veronica serpyllifolia* ssp. *humifusa* (Dicks.) Pennell 366  
*Veronica serpyllifolia* var. *borealis* Laest. 366  
*Veronica serpyllifolia* var. *humifusa* (Dicks.) Pennell 366  
*Veronica serpyllifolia* var. *thymifolia* Herder 367  
*Veronica serpyllifolia*  $\gamma$ . et  $\delta$ . C. Koch 365  
*Veronica serpylloides* Rgl. 488  
*Veronica serrulata* Pall. 386  
*Veronica sessiliflora* Bge. 391  
*Veronica sessilifolia* Opiz 381  
*Veronica setulosa* Koch 383  
*Veronica sibirica* L. 495  
*Veronica sibirica* Gmel. 495  
*Veronica Sintenisii* Hausskn. 465  
*Veronica spicata* L. 379, 381  
*Veronica spicata* Römpf 372  
*Veronica spicata*  $\times$  *longifolia* L. 382  
*Veronica spicata* ssp. *carpatica* Dostal 384  
*Veronica spicata* ssp. *transcaucasica* Bordz. 383  
*Veronica spicata* var. *cristata* (Bernh.) Koch 384  
*Veronica spicata* var. *orchidea* (Crantz) Schmalh. 384  
*Veronica spicata* var. *viscosissima* Kar. et Kir. 382  
*Veronica spicata* b. *Barrelieri* (Schult.) Schmalh. 383  
*Veronica spicata* d. *V. euxina* Turill. 382  
*Veronica spicata*  $\alpha$ . *vulgaris* Koch 381  
*Veronica spicata*  $\beta$ . *bellidifolia* Wallroth 379  
*Veronica spicata*  $\beta$ . *hybrida* Koch 383  
*Veronica spicata*  $\beta$ . *latifolia* Koch 381  
*Veronica spicata*  $\beta$ . et  $\gamma$ . C. Koch 383  
*Veronica spicata*  $\gamma$ . *lancifolia* Koch 381  
*Veronica spicata*  $\delta$ . C. Koch 381  
*Veronica spicata*  $\delta$ . *setulosa* Koch 383  
*Veronica spicata*  $\epsilon$ . *cristata* Koch 383  
*Veronica spicata-racemosa* Gilib. 365  
*Veronica spuria* auct. 386  
*Veronica spuria* L. 376, 385  
*Veronica spuria* var. *angustifolia* Makino 386  
*Veronica spuria* var. *brevifolia* (M. B.) C. A. M. 376  
*Veronica spuria*  $\rho$ . Ldb. 386  
*Veronica Stelleri* Pall. 363  
*Veronica Stephaniana* Roem. et Schult. 376  
*Veronica steppacea* Kotov 383  
*Veronica stylophora* M. Pop. 400  
*Veronica subsessilis* (Miq.) Carrière 371  
*Veronica syspirensis* C. Koch 443  
*Veronica taurica* Willd. 443  
*Veronica telephiifolia* Römpf 459  
*Veronica telephiifolia* Vahl 461  
*Veronica telephiifolia* Vahl var. *livanensis* (C. Koch) O. Ktze f. *incisa* Wulff 461  
*Veronica telephiifolia* Vahl var. *livanensis* O. Ktze. 461  
*Veronica telephiifolia* var. *minuta* (C. A. M.) Trautv. 459  
*Veronica telephiifolia*  $\beta$ . *pilosula* Boiss. 461  
*Veronica teberdensis* (Kem.-Nath.) Boriss. 493  
*Veronica tenella* All. 365  
*Veronica tenerrima* F. W. Schmidt 475  
*Veronica tenuifolia* M. B. 444  
*Veronica tenuis* Ldb. 470  
*Veronica tenuissima* Boriss. 403  
*Veronica tetraphylla* Pop. 403  
*Veronica tetraphyllos* Boeber 403  
*Veronica teucrium* Bge. 436  
*Veronica teucrium* L. 434, 435  
*Veronica teucrium* ssp. *altaica* Watzl. 436  
*Veronica teucrium* ssp. *pseudochamaedrys* (Jacq.) Nym. 434

- Veronica teucrium* var. *anisophylla* Trautv. 434  
*Veronica teucrium* ssp. *integerrima* Trautv. 434, 440  
*Veronica teucrium* ssp. *minor* Trautv. 436  
*Veronica teucrium* ssp. *multifida* Wallr. 445  
*Veronica teucrium* a. *latifolia* Schmalh. 434  
*Veronica teucrium* b. *austriaca* Čelak. 435  
*Veronica teucrium* b. *dentata* Čelak. 435  
*Veronica teucrium* c. *austriaca* Schmalh. 445  
*Veronica Teucrium*  $\alpha$ . *typica* Lindem. 434  
*Veronica Teucrium*  $\beta$ . *angustifolia* Vahl. 435  
*Veronica Teucrium*  $\gamma$ . *austriaca* Arcang. 438  
*Veronica tianschanica* Linez. 488  
*Veronica Tournefortii* C. C. Gmelin 411  
*Veronica transcaucasica* Bordz. 383  
*Veronica trifida* Gilib. 421  
*Veronica triloba* Opiz 413  
*Veronica tripartita* Boriss. 447, 449  
*Veronica triphyllus* L. 405  
*Veronica tubiflora* Fisch. et Mey. 494  
*Veronica tubiflora* var. *Linneana* Kom. 495  
*Veronica tubiflora* var. *velutina* Kom. 495  
*Veronica turkmenorum* B. Fedtsch. 422  
*Veronica umbrosa* M. B. 432  
*Veronica urticaefolia* auct. 432  
*Veronica urticifolia* Jacq. 456  
*Veronica Velenovskyi* Uechtr. 474  
*Veronica verna* L. 421  
*Veronica verna* var. *campestris* Schmalh. 420  
*Veronica verna* var. *Dillenii* (Crantz) B. Fedtsch. 420  
*Veronica verna* var. *simplex* Gruner 422  
*Veronica verticillata* Gilib. 368  
*Veronica virginica* auct. 495  
*Veronica virginica* L. 494  
*Veronica virginica* var. *sibirica* (L.) Nakai. 494, 496  
*Veronica viscida* Waldst. 406  
*Veronica viscosa* Pall. 382  
*Veronica yezoensis* Nakai 363  
*Veronicastrum seminibus planis* Koch 356, 481  
*Veronicastrum* Benth., sect. 329, 494  
*Veronicastrum* Heist., gen. 494  
*Veronicastrum* (Heist.) Boriss., subgen. 494  
*Veronicastrum* § *Annuae* Benth., sect. 418  
*Veronicastrum dentatum* Opiz 435  
*Veronicastrum incisum* Moench 386, 391  
*Veronicastrum laciniatum* Moench 386  
*Veronicastrum prostratum* Opiz 437  
*Veronicastrum serpyllifolium* Fourr. 365  
*Veronicastrum sibiricum* (L.) Hara 495  
*Veroniceae* Benth. 329  
*Veronicella* Fourr., gen. 329, 355  
*Veronicella* (Fourr.) Boriss., subgen. 355  
*Veronicella chamaedrys* Fourr. 431  
*Veronicella urticaefolia* Fourr. 456  
*Versicolores* (Benth.) Wettst., sect. 417  
*Wintheringeae* Miers, tribus 56, 60













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